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Project No.: EG.CPR/99/G31

Agresso No.: 16000797

Contract No.: 05/031

Final Report

to
United Nations Industrial Development Organization (UNIDO)

for the Project Entitled

UNDP/GEF Energy Conservation and Greenhouse Gas Emissions Reduction in Chinese

TVEs—Phase -II

Subcontract Title

Brick Sector Replication Projects for Energy Efficiency (1)

Submitted by

Xi'an Research and Design Institute of Wall & Roof Materials

On June, 2006

**UNDP/GEF Energy Conservation and GHG Emissions
Reduction in Chinese TVEs—Phase II**

Brick Sector Replication Projects for Energy Efficiency (1)

Final Report

Project No.: EG/CPR/99/G31

Agresso No.: 16000797

Contract No.: 05/031

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June, 2006

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1 Preface and Thanks

1.1 Preface

This document is the final report of technical renovation for fifteen recipient plants submitted to Project Management Office (PMO) and the United Nations Industrial Development Organization (UNIDO), prepared by Xi'an Research and Design Institute of Wall & Roof Materials, related to the project of "Energy Conservation and GHG Emissions Reduction in Chinese TVEs-Phase II". This report covers the work and achievement completed during the beginning of March and the middle of August 2005.

Project title: Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II)
-Brick Sector Replication Projects for Energy Efficiency (1)

Project No.: EG/CPR/99/G31, P.O.No. 16000797

Contract No.: 05/031

The contract of this project was signed on the beginning of March. Our Institute completed two parts of the tasks stipulated in the contract through ten activities.

This report includes the following parts.

- a) Summary of achievements
- b) Final accounts
- c) Summary of progress

1.2 Thanks

We greatly appreciate the help from the following personnel. Without their support and guide, we can't complete this project smoothly.

Mrs. Wang Guiling, Deputy Director of PMO

Dr. Zhang Zhihong, Chief Technical Adviser of UNIDO

Mr. Song Dongfeng, Contract Officer of PMO

Other personnel of Beijing Hongyuan Environment and Energy Technology Company

Mrs. Mounira Latrech, Contract Officer of UNIDO

Dr. Enver Khan and other working personnel

2. Summary of the project and result of technical renovation

2.1 Achievements of the project

Until the middle of August 2005, our Institute completed all works stipulated in the Contract of renovation for fifteen brick-making recipient enterprises in Xi'an area, including construction on

site and consultation work.

The total investment for fifteen recipient enterprises was US\$1,030,774.08 million, comprising US\$850,774.08 million co-financing of the beneficiary plants and US\$180,000.00 million UNIDO subsidy fund. The co-financing to the UNIDO subsidy fund is 4.7:1.

Through the technical renovation, the total energy saving is 9910.09 tons of coal equivalent (tce) yearly, or 660.67 tce per year apiece for a total of 15 brick plants. The energy-saving target for each replication project of 600 tce per year on average stipulated in the Contract is completed. And gas emission of CO₂ is reduced 24705.85 tons.

According to the specific institution of each plant, through renewing old equipments and adopting advanced and practical equipment, repairing old annular kiln and building new annular kiln, and improving and perfecting production process and management system to make arrangement of the renovated production line of each replication enterprise reasonable, the product's quality and output of each replication plant is improved at different degree and the consciousness of modern management and energy conservation is reinforced.

The details are as follows.

1. Adopting technical renovation measure implemented in pilot enterprise to reduce coal consumption and electricity consumption and gas emission of CO₂.

In energy conservation renovation for the pilot enterprise, Xi'an Liucun Hollow Brick Plant, technology such as new energy-saving annular kiln, electricity-saving compensator, transducer and rectangular hole was adopted to reduce coal and electricity consumption greatly and brought good economic benefit to the plant.

With adopting energy conservation technology and the successful experience benefited from the pilot enterprise, technical renovation for 15 replication brick-making enterprises get good result. Coal consumption and electricity consumption of each plant is reduced at different degree, while the energy consumption of 10 thousand bricks of part plants is superior to pilot enterprise. For example, the energy consumption of 10 thousand bricks in Shenwei Wall materials Plant, Xi'an is 1.01 tons of coal equivalent (tce) and that in Shijiadao Hollow Brick Plant is 1.03 tce, both are superior to 1.06 tce in Xi'an Liucun Hollow Brick Plant. As well gas emission of CO₂ resulted from burning coal is reduced due to low coal consumption.

Energy conservation renovation bring direct and obvious economic for enterprise, strengthen the consciousness and decision of developing energy-saving and GHG reduction work of each enterprise and bring along technical renovation in brick and tile enterprises. For example, the other brick and tile enterprises including Zhongdian Brick Plant, Baqiao District, Xi'an, Zhixing

Brick Plant, Changan District, Xi'an, and Xi'an Aoda Longtian Co. Ltd hope to implement technical renovation in their enterprise. At present, electricity compensator has become the popular energy conservation technology in brick and tile enterprise in Xi'an and Shaanxi.

(The detailed energy consumption and investment of each plant see brick-making replication form of Xi'an 15 replication enterprises.)

2. To help the enterprises perfecting management system and improving production efficiency by developing energy-saving technology and modern management knowledge training.

Before the renovation, high economic benefit is from high output through working over time blindly in each enterprise. As well the management in production process is not strict, which results in high cost, high energy consumption and high rejected product rate. During the implementation process, we develop the staff training for technical and key position operation personnel and manager of each enterprise to make them grasp the main point to his own position, and help enterprise building and perfecting management system and determining energy consumption index for each position. Furthermore the personnel is conscious that output, product quality and factual institution of energy saving is related to their working closely. So the production efficiency and rate of qualified product is improved and energy consumption is reduced. (Details of training see 4.2 of the report)

3. Carving visual field and renewing thought and idea of the enterprises through the technical renovation.

Through visiting pilot enterprise on the spot and participating in training, the enterprises understand that the application of new technology and new idea can bring huge motive force for enterprise's development and considerable economic benefit. Each enterprise is willing to pay more attention to renewing technology and knowledge of staff, and to invest more much capital in adopting new technology and energy conservation equipments. The enterprises change the idea that they would rather hire labor by much money than invest more capital in renewing technology with long payoff period.

Each enterprise works out a long-term plan on new product development, energy conversation, staff training and technical renovation to do good spadework for perfecting competitive market.

2.2 Proposal

We propose to set up standard system of energy efficiency, energy consumption and GHG emission in order to develop work of energy conservation and GHG emission in law, and to prompt the development of the work more forcefully in large range.

1. Drawing up standard of limit of environmental pollution smoke emission of brick and tile kiln and accessories.
Most of the fuel is coal in brick and tile industry in China, and the majority is inferior coal. A large of carbon dioxide and sulfur dioxide produced from burning coal pollutes the air seriously and aggravates the greenhouse effect. Drawing up the standard will prompt the environmental protection.
2. Drawing up standard of management and furnishing of energy measure equipment in brick and tile enterprise.
Drawing up the standard will prompt exact measure and scientific management of the energy management work in brick and tile enterprise, and make it to be the focal point of day-to-day work.
3. Drawing up series standard of energy consumption determining method in brick and tile industry including testing and calculating of energy consumption grade quota, heat balance, heat efficiency, unit product heat consumption and unit product coal consumption of industry kiln for burning brick and tile and drying chamber.
Drawing up the standard system can help the enterprise knowing current self-energy consumption institution and the potentiality of energy saving, providing standard basis for healthy and orderly development of brick and tile industry, and prompting technical advance in brick and tile industry so that the work of energy conversation of Chinese brick and tile industry develop in order and continuously.
4. During the technology advance and development process of brick and tile industry, relevant standard on the basis of measure and determination of resources comprehensive utilization in brick and tile industry should be drawn up to move overall, coordinated and continuous growth of the work of forbidding the use of clay solid brick and wall material reform.

3. Final accounts of the project

Xi'an Research and Design Institute of Wall and Roof Materials of China Building Material had completed energy conservation technical renovation of 15 replication brick and tile enterprises in Xi'an. Final accounts of total investment for 15 replication enterprises are US\$ 1,030,774.00, comprising US\$180,000.00 UNIDO subsidy fund and US\$850,774.00 co-financing of the replication enterprises. The co-financing to UNIDO subsidy fund is 4.7:1.

The total UNIDO investment for this subcontract is US\$180,000, or US\$12,000 apiece for a total of 15 brick plants on average. 30 percent of UNIDO subsidy fund is for consulting services and engineering services, while 70 percent is reserved for the necessary material and equipment

purchase and construction for the beneficiary plants. The co-financing is fully used for equipment purchase and construction.

Final accounts of each enterprise see table 1.

Table1 Final Accounts of Technical Renovation for 15 Replication Enterprises in Xi'an

Unit: US \$ 1,000

No	Name of Enterprise	Budget Allocation in Feasibility	Final Accounts	Co-finance	UNIDO Subsidy	The Co-finance to the UNIDO Subsidy Fund
1	Hollow Brick Plant, Baling Town, Baqiao District, Xi'an	62.300	62.507	50.507	12.00	4.2
2	Hongqi New Type Building Materials Co. Xi'an	67.133	69.765	57.765	12.00	4.8
3	Hongfang Building Materials Co.	60.000	68.273	56.273	12.00	4.7
4	Baling Liucun Brick Plant, Baqiao District, Xi'an	56.206	65.248	53.248	12.00	4.4
5	Molingmiao Brick Plant	97.796	103.165	91.165	12.00	7.6
6	Qinling Building Materials Co.	60.227	60.424	48.423	12.00	4.0
7	Shenwei Wall materials Plant, Xi'an	61.014	64.483	52.483	12.00	4.4
8	Shenlu New Type Building Materials Co. Ltd, shaanxi	59.854	60.319	48.319	12.00	4.0
9	Shenlufang No.5, Brick Plant, Baqiao District, Xi'an	59.849	61.651	49.651	12.00	4.1
10	Shijiadao Hollow Brick Plant	65.892	61.995	49.995	12.00	4.2
11	Xi'an Oriental Hollow Brick Plant	60.963	60.970	48.970	12.00	4.1
12	Chang'an Xibei Building Plant	70.244	81.125	69.125	12.00	5.8
13	Xiangfa New Building Materials Co., Xi'an	60.470	61.537	49.537	12.00	4.1
14	Hongqi St. Xiangyanggou Brick Plant, Baqiao District, Xi'an	68.824	87.963	75.963	12.00	6.3
15	Xinyue Industry and Trade Co. Ltd	60.291	61.349	49.349	12.00	4.1
16	Total	971.063	1,030.774	850.774	180.00	4.7

4 Summary of specific work

4.1 Project task

Our Institute completed two parts of the task under this subcontract.

Part One involves consulting services for 15 potential replication plants, including carrying out a plant-level assessment, preparing a project proposal and feasibility study, and setting up a plant-wide management system.

Part Two involves engineering services to implement the 15 replication projects, including

engineering design and construction, equipment purchase and installation, and personnel training. Specific tasks are as follows.

Part One: Consulting Services

1. Conduct a comprehensive assessment of 15 recipient brick plants, including but not limited to the following aspects: production processes, technologies and equipments, raw materials, energy and electricity use, products, output, and markets, production workers and technical personnel, ownership, fixed assets, loans, and other financial information.
2. Based on the above assessment and in consultation with plant management, propose a list of measures and investments to the plant management to upgrade the original production technologies and equipment, which will result in improved product quality, less energy consumption, and a more profitable enterprise in the long run. The energy-saving target for each replication project should be at least 600 tons of coal equivalent (tce) per year on average. The contractor may draw on the successful experiences of the pilot plants in terms of technology, equipment, and management, but the proposed renovation measures and investments must suit the conditions of the potential replication plants.
3. Conduct a feasibility study of the proposed measures and investments (including energy savings) and devise an implementation plan for engineering design and construction, equipment purchase and installation, testing and commissioning, training of operators, as well as financing arrangement. In the feasibility study, the contractor should devise in detail the use of the 70 percent reserved for equipment purchase and construction for the beneficiary plants.
4. Ensure that the proposed renovation project is fully agreed by the plant management and that co-financing can be and will be arranged to implement the project. The minimum co-financing requirement from the recipient plants to the complete technical renovation project budget is 4:1 (includes technical services and equipment procurement). It is imperative that co-financing of the beneficiary plant will be made available for project implementation in the timeframe specified in the implementation plan.
5. Assist each plant management to set up a system (or strengthen the existing system if one already exists) so as to improve the current practices of production management, energy management, quality inspection, personnel training, and other areas that may require attention.

Part Two: Engineering Services

1. Based on the feasibility study and implementation plan agreed by the plant management, conduct engineering design for each of the renovation projects.

2. Assist the plant management in selection and purchasing the required equipments and ensure their installation, testing, and commissioning.
3. Ensure that the renovation projects meet relevant environmental and safety standards and the projects are approved by the local environmental and other relevant authorities.
4. Provide relevant training to the plant operators and technical personnel as necessary.
5. Provide other engineering services to the plant management to ensure smooth operation of the new equipment and processes so that they meet the specified parameters and targets.

4.2 Summary of activities and progress

To ensure the project implementing smoothly, we organized working team for the project. The team has ten members. They are efficient and high-level technical professors with rich experience in brick plant design, energy efficiency renovation and production management.

The leader of this team and UNIDO liaison man is Mr.Xiao Hui, the president of Xi'an Research & Design Institute of Wall and Roof Materials.

Members: Zhou Xuan, Wang Baocai, Linling, Tang Baoquan, Lu Xiaobin, Cheng Xiangwei, Jiang Xianli, Liu Zhaozhong, Liu Xiaodong.

The team leader and relevant personnel attended a briefing meeting of the project in Beijing on March 11, 2005 and had an informal discussion with the officer of UNIDO, person in charge of PMO and LPIC, and Beijing Hongyuan Environment and Energy Technology Company. We introduced preparation institution including advantage of our Institute and work plan and way for implementing the project and discussed technical schedule and plan.

Our Institute completed two parts of the tasks through ten activities.

Activity 1 Investigation the basic situation of each plant and evaluation on the enterprises

From March 12, 2005 to March 23, 2005, the working team investigated the 15 replication plants to know the basic situation. Xi'an Wall Material Reform Office attended.

Activity 2 Holding seminar and proposing technical renovation plan

From March 13, 2005 to March 30, 2005, Xi'an wall material reform office organized 2 times seminars to determine the technical plan of each beneficiary plant. All the members of the working team and managers of 15 beneficiary plants attended.

Activity 3 Completing feasibility study report

Based on the investigation and seminar, our Institute completed the feasibility study report and the detailed list of equipments for 15 replication enterprises. The 15 plants accepted their own feasibility study report. And they signed the letter of commitment to assure that they would implement technical renovation according to the plan in the Feasibility and reserve the UNIDO subsidy fund for purchasing equipment listed in the Feasibility and assure the co-financing.

The 15 *Feasibility Study Report* was completed on April 2, 2005 and submitted on May 12, 2005. The main contents are as follows.

- a) General
- b) Market prediction
- c) Evaluation on resource
- d) Production scale and product dimension
- e) Current institution of the replication and technical renovation plan
- f) Working schedule
- g) Budget allocation and financing
- h) Financial evaluation
- i) Evaluation on energy efficiency and environment
- j) Conclusion and suggestion

Activity 4 Submitting working drawing and list of equipments

By April 21, 2005, the working drawing was completed and it was submitted directly to 15 beneficiary plants. The catalogue of the drawing and list of equipments were submitted to UNIDO and PMO.

Activity 5 Equipment purchase and old equipment renovation

The new equipments were begun ordering from April 22, 2005. Engineering construction was begun at the same time.

The *Progress Report* was completed and submitted to UNIDO and GEF on June 27, 2005.

Activity 6 Engineering construction and equipment installation

The new equipments were transported to relevant plant successively and were installed next. The new equipments installation and old equipments renovation was completed on July 3, 2005.

Activity 7 Project's commissioning and evaluation on actual result

Commissioning of the 15 technical renovation projects and evaluation on actual result was completed by July 15, 2005. Then the *Installation and Commissioning Report* was submitted to UNIDO and PMO.

Activity 8 Management system construction

All together with the commissioning, working team helped the 15 beneficiary plants to set up and perfect management system according to apiece institution.

On the basis of investigation and assessment of enterprise's institution and according to its factual institution, experts of the working team helped the Plant constructing new management system or renewing original management system, setting up purchasing and using regulation of coal and electricity, post operation system and quality testing system of the product, and perfecting system of quota responsibility, rewards and penalties, and consumption index in order to strengthen production management, energy management and quality inspect and improve management production level. The main contents includes following aspects.

- ◇ Develop modern enterprise management knowledge training for the manager.
- ◇ Help the enterprise perfect the original management system.
- ◇ Draw worker regulations for the factory.
- ◇ Set up inspective and controlling management system for consumption of coal and electricity.
- ◇ Draw workshop management system.
- ◇ Draw equipment management system.
- ◇ Draw product quality inspecting and management system.
- ◇ Set up and perfect financial, staff and salary management system.
- ◇ Set up worker operation manual.

Activity 9 Staff training including energy conservation and relevant technology training

From July 15, 2005 to July 22, 2005, field training of 15 Plants was completed. From July 25, 2005 to July 28, 2005, managers and workers of key position were centralized training.

- a) During the construction, developing training for the workers of key position about detailed work to improve their job skill

Training for: operator on key position

Training site: 15 Plants

Training time: during the services for the plant by experts

Training content:

- ◇ Operation rules and routine maintenance for machinery equipment.
- ◇ How to establish and control firing system of Hoffmann kiln.
- ◇ Emergency measures of firing process of Hoffmann kiln.
- ◇ How to utilize new technology and new equipment to save energy and reduce consumption.

- b) Centralized training

From July 25, 2005 to July 28, 2005, Xi'an Research and Design Institute of Wall & Roof

Material held a training class for the replication enterprise in Tangyu Holiday Village, Mei County, Shaanxi during. There were 50 persons including manager and vice manager of the replication enterprises, part of key position technical person, local government officers and subcontractor in this training class.

Training for: main technical and management personnel and workers on key position

Training site: Tangyu Holiday Village, Mei County, Shaanxi

Training time: From July 25, 2005 to July 28, 2005

Training content:

- ◇ Target of this project, important technology and target and effect of energy conservation and GHG reduction.
- ◇ The enterprise's situation of Chinese brick making and domestic and international new technology development trend.
- ◇ The propaganda of the file and preferential policy of the national relevant walls material reforms.
- ◇ Means and method of the production management.
- ◇ Standards of brick and tile.
- ◇ Precondition and method of improving product's quality.
- ◇ Establishment of modern enterprise management system.
- ◇ Installation and commissioning of energy conservation equipment land, safety technology in operation.
- ◇ Management of energy conservation equipment and kiln in brick-making plant.

Training method:

- a) Adopt lessons, discuss and answer questions.
- b) The experts gave lessons with the unified teaching material, combining teaching by oneself.

4.3 Summary of completing institution of the 15 replication technical renovation

By the middle of August, the completed result of 15 replication plants is as follows.

4.3.1 Hollow Brick Plant, Baling Town, Baqiao District, Xi'an

1. Completed content of process design

- a) Process layout drawing
- b) Installation drawing of the following newly added equipments
 - i) Type $\phi 800 \times 600$ high speed fine rolls
 - ii) Type JZK50/45-3.0 vacuum extruder
 - iii) Cinder crusher
- c) Repair scheme of the original annular kiln was completed. The leak of kiln was repaired. Technology of advanced heat preservation and energy saving was adopted, including using the

heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. The kiln roof was removed and rebuilt. The chamber's wickets were repaired. Temperature tester was added for annular kiln.

d) Completing renovation schedule of electric equipments

1 set of transducer was added to exhaust blower. 1 set of non-power compensator was added to motor of extruder and mixer apiece. 4 sets of non-power compensators were added to motor of rolls.

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 2 were completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 2 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	ZL30PG	Set	1	
2	Hi-speed fine rolls	φ 800×600	Set	1	
3	Cinder Crusher	600×630	Set	1	
4	Non-power compensator for motor of mills	WMJ series	Set	4	☆
5	Non-power compensator for motor of mixer	WMJ series	Set	1	☆
6	Non-power compensator for motor of Type 45/40 vacuum extruder	WMJ series	Set	1	☆
7	Vacuum extruder	JZK50/45-3.0	Set	1	
8	Vertical column cutter	QT107	Set	1	
9	Measure apparatus of caloric value	Type NW	Set	1	
10	Transducer for exhaust blower	WMJ series	Set	1	☆
11	Die renovation	JZK50/45-3.0	Set	2	

In addition, drainage system of green yard was renovated. Kiln roof was removed and rebuilt. Fee for installing and commissioning the equipments listed in form 1 and drainage system renovation was invested by UNIDO subsidy fund.

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined to saving 707 tons of coal equivalent (tce) per year, and to reduce gas emissions of CO₂ 1762. 55 tons per year. Comparison of the technical index between renovation before and after sees form 3.

Form 3 Comparison of the technical index Between Renovation Before and After

Index	Unit	Before	After
Output	(Common brick equivalent)× 10,000 bricks/year	24,00	2,688
Coal consumption	kg ce /10,000 bricks (Common brick equivalent)	1,250	1,000
Electricity consumption	kg ce /10,000 bricks (Common brick equivalent)	70	54
Rate of acceptance	%	78	90
Perforation	%	22~23, 33~35	25, 45

4.3.2 Hongqi New Type Building Materials co., Xi'an

1. Completed contents of engineer design

- a) Process layout drawing
- b) Installation drawing of hi-speed fine rolls
- c) Installation drawing of two-stage vacuum extruder
- d) Renovation schedule of repairing annular kiln and drainage system of green yard
- e) Completing renovation schedule of electric equipments

1 set of transducer was added to blower. 1 set of non-power compensator was added to extruder.

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 4 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 4 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Repair annular kiln	24 chambers	Set	1	
2	Repair green brick yard	35,000	m ²	35,000	☆
3	High-speed fine rolls	φ 800×600	Set	1	
4	Bulldozer and accessory	Dong Fang Hong -70	Set	1	
5	Energy conservation blower and accessory	ZFJ-8	Set	2	☆
6	Accessory	/	Set	5	
7	Damp	/	Set	24	☆
8	Non-power compensator	WMJ series	Set	1	☆
9	Transducer for blower	WMJ series	Set	1	☆
10	Two-stage vacuum extruder	JZK50/45-3.0	Set	1	
11	Vertical column cutter	QT107	Set	1	
12	Temperature tester	1200°C	Set	1	

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined that the renovation production line reaches the following targets.

- a) The rate of acceptance is improved by 12 percent.
- b) The comprehensive energy conservation is 632.98 tce yearly.
- c) The gas emission of CO₂ is reduced 1,578.03 tons yearly.

Comparison of the technical index between renovation before and after sees form 5.

Form 5 Comparison of the technical index Between Renovation Before and After

Name		Unit	Before	After
Output		(Common brick equivalent) × 10,000 bricks/year	4,400	4,600
Rate of acceptance		%	80	92
Perforation	Fired perforated brick	%	23	25
	Fired hollow brick	%	33	37
Coal consumption		kg ce /10,000 bricks (Common brick equivalent)	1,100	970
Electricity consumption		kg ce/10,000 bricks (Common brick equivalent)	61	54

4.3.3 Hongfang Building Materials Co.

1. Completed contents of engineer construction

- a) Completed process renovation (process layout drawing)
- b) Installation drawing of the following equipments
 - i) Cinder crusher
 - ii) Type $\phi 800 \times 600$ hi-speed fine rolls
 - iii) Type SJJ240-36 mixing extruder
- c) Repair scheme of the original annular kiln was completed. The leak of kiln was repaired. Technology of advanced heat preservation and energy saving was adopted, including using the heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. The kiln roof was removed and rebuilt. The chamber's wickets were repaired. Temperature tester was added for annular kiln.
- d) Completing renovation schedule of electric equipments
 Transducer controlling system was added to kiln blower. Non-power compensator was added to extruder, hi-speed fine rolls and mixing extruder apiece. Electricity saving compensator was used.

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 6 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 6 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	ZL30PG	Set	1	
2	High-speed fine rolls	$\phi 800 \times 600$	Set	1	☆
3	Mixing extruder	SJJ240-36	Set	1	
4	Cinder crusher	600×630	Set	1	
5	Non-power compensator for mills	WMJ series	Set	4	☆
6	Non-power compensator for motor of mixer	WMJ series	Set	1	
7	Non-power compensator system for Type 45/40 extruder	WMJ series	Set	1	
8	Vertical column cutter	QT2000	Set	1	
9	Measure apparatus of caloric value	Type NW	Set	1	
10	Transducer for exhaust blower	WMJ series	Set	1	
11	Model, die, core	JZK45/40	Set	2	☆

In addition, drainage system of green yard was renovated. Kiln roof was removed and rebuilt. Damp and fire core cover was changed. Fee for changing damp and fire core cover was invested by UNIDO subsidy fund.

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined to saving 787.19 tce per year, and to reduce gas emissions of CO₂ 1,962.47 tons per year. Comparison of the technical index between renovation before and after sees form 7.

Form 7 Comparison of the technical index Between Renovation Before and After

Index	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	26,00	3,000
Coal consumption	kg ce /10,000 bricks (Common brick equivalent)	1,250	1,000
Electricity consumption	kg ce /10,000 bricks (Common brick equivalent)	70	54
Rate of acceptance	%	78	90
Perforation	%	22~23, 33~35	26, 40

4.3.4 Baling Liucun Brick Plant, Baqiao District, Xi'an

1. Completed content of engineer design

a) Annular kiln renovation

The original 38 chambers annular kiln was repaired through removing and rebuilding the kiln roof and sealing the leak.

b) Green yard repairing

The original green yard of this plant was renovated. Fired hollow brick was used to make hack. The height of the hack was increased. The hack width is 0.6m, passage between hack is 1.4m, and hack height is 0.15m. The area of the green yard is 35,000m² after renovation.

c) Completing renovation scheme of electric equipment

1 set of non-power compensator was added to two-stage vacuum extruder. 1 set of transducer was added to energy conversation blower.

d) Completing the following drawings

- i) Process layout drawing
- ii) Installation drawing of hi-speed fine rolls
- iii) Installation drawing of two-stage vacuum extruder

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 8 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 8 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Remove kiln cover and rebuild it	38 chambers	Set	1	<input type="checkbox"/>
2	Drainage system renovation	35,000	m ²	35,000	
3	Hi-speed fine rolls	φ 800×600	Set	1	
4	Vacuum extruder	JZK45/40	Set	1	
5	Model, die, core	JZK45/40	Set	1	
6	Vertical column cutter	QT107	Set	1	<input type="checkbox"/>
7	Green cutter	YHQ18-425	Set	1	
8	Bulldozer	Dong Fanghong -70	Set	1	
9	Tube	550mm	Set	2	
10	Gear	M2-5	Set	2	
11	Non-power compensator controlling system	WMJ series	Set	1	<input type="checkbox"/>
12	Energy conservation blower	ZFJ-8	Set	1	<input type="checkbox"/>
13	Measure apparatus of caloric value	Type NW	Set	1	<input type="checkbox"/>
14	Temperature tester of annular kiln	1200°C	Set	1	
15	Transducer for blower	WMJ series	Set	1	<input type="checkbox"/>
16	Conveyor	B500	Set	5	

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined that the renovation production line reaches the following targets.

- The output is improved by 12 percent. The rate of acceptance is improved by 10 percent.
- The comprehensive energy conservation is 611.47 tce yearly.
- The gas emission of CO₂ is reduced 1,524.40 tons yearly.

Comparison of the technical index between renovation before and after sees form 9.

Form 9 Comparison of the technical index Between Renovation Before and After

Name		Unit	Before	After
Output		(Common brick equivalent) × 10,000 bricks/year	2,148	2,400
Rate of acceptance		%	83	93
Perforation	Fired perforated brick	%	22~23	25
	Fired hollow brick	%	33~35	37
Coal consumption		kg ce/10,000 bricks (Common brick equivalent)	1,200	950
Electricity consumption		kg ce/10,000 bricks (Common brick equivalent)	71	63

4.3.5 Molingmiao Brick Plant

1. Completed content of engineer design

- Process layout drawing
- Installation drawing of Type φ 800 × 600 stone eliminating rolls
- Installation drawing of Type φ 800 × 600 hi-speed fine rolls
- Installation drawing of Type JZK50 vacuum extruder
- Installation drawing of Type SJ3000 double shaft mixer

- i) Working drawing of 24 chambers annular kiln
Temperature tester and 1 set of Type ZFJ-8 energy saving kiln blower was used.
 - j) Repair schedule of the original annular kiln
 - k) Renovation schedule of electric equipments
1 set of transducer controlling system was added to kiln blower. 1 set of non-power compensator was added to extruder.
2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 10 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 10 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Stone-elimination mill crusher	φ 800×600	Set	1	
2	Hi-speed fine rolls	φ 800×600	Set	1	
3	Double shaft mixer	SJ3000	Set	1	☆
4	Column cutter	QJ1100	Set	1	
5	Green cutter	YHQ18-425	Set	1	
6	Two-stage vacuum extruder	JZK50/45	Set	1	
7	Temperature tester for annular kiln	1200°C	Set	1	
8	Damp for annular kiln	/	Set	24	
9	Blower	ZFJ-8	Set	1	
10	Non-power compensator for blower	SL-10	Set	1	☆
11	Non-power compensator for	WMJ series	Set	1	

In addition, drainage system renovation, kiln renovation and commissioning and construction of new annular kiln were completed.

3. Comparison of the technical index between renovation before and after
Through running for three months, it is determined to saving 638.83 tce per year, and to reduce gas emissions of CO₂ 1,592.59 tons per year. Comparison of the technical index between renovation before and after sees form 11.

Form 11 Comparison of the technical index between renovation before and after

No.	Unit	Before	After
1	Output (Common brick equivalent) × 10,000 bricks/year	2,000	3,000
2	Coal consumption (kg ce/10,000 bricks (Common brick equivalent))	1,200	1,000
3	Rate of acceptance (year, %)	80	92
4	Perforation (%)	22-23, 33-35	26, 43
5	Electricity consumption (kg ce/10,000 bricks (Common brick equivalent))	60	52

4.3.6 Qinling Building Materials Co.

1. Completed content of engineer design

- a) Process layout drawing
- b) Installation drawing of Type $\phi 800 \times 600$ hi-speed fine rolls
- c) Installation drawing of cinder crusher
- d) Working drawing of new 24 chambers annular kiln
- e) Repair schedule of electric equipments

4 sets of non-power compensator were added to motor of rolls. 1 set of non-power compensator is added to mixer and extruder apiece. 2 sets of transducer were added to exhaust blower.

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 12 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 12 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	W-4	Set	1	
2	High-speed fine rolls	$\phi 800 \times 600$	Set	1	
3	Cinder crusher	STS865	Set	1	
4	Non-power compensator for mills	WMJ series	Set	4	
5	Non-power compensator for mixer	WMJ series	Set	1	
6	Non-power compensator for Type 45/40 vacuum extruder	WMJ series	Set	1	
7	Vertical column cutter	QJ1100	Set	1	
8	Die	/	Set	2	☆
9	Transducer for exhaust blower	SL-10	Set	2	
10	Measure apparatus of caloric value	Type NW	Set	1	

In addition, drainage system renovation, old annular kiln renovation and commissioning of new annular kiln were completed. Fee for drainage system renovation was invested by UNIDO subsidy fund.

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined to saving 633.96 tce per year, and to reduce gas emissions of CO₂ 1,580.46 tons per year. Comparison of the technical index between renovation before and after sees form 13.

Form 13 Comparison of the technical index between renovation before and after

Name	Unit	Before	After
Output	(Common brick equivalent) $\times 10,000$ bricks/year	2,000	3,000
Rate of acceptance	%	77	87
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,250	1,056
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	54

4.3.7 Shenwei Wall materials Plant, Xi'an

1. Completed content of engineer design

- a) Process layout drawing
- b) Installation drawing of hi-speed fine rolls
- c) Installation drawing of cinder crusher
- d) Working drawing of new 24 chambers annular kiln
- e) Repair schedule of the original annular kiln
- f) Renovation schedule of electric equipments

2 sets of transducers were added to kiln blower. 1 set of non-power compensator was added to motor of extruder.

- g) Renovation schedule of the drainage system of green yard.

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 14 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form14 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Remove and rebuild annular kiln	24chambers	Set	1	
2	Repair and seal kiln	24chambers	Set	1	□
3	Green brick yard renovation	30,000	m ²	30,000	
4	High-speed fine rolls	φ 800×600	Set	1	
5	Measure apparatus of caloric value	Type NW	Set	1	
6	Cinder crusher	600×630	Set	2	
7	Vertical column cutter	QT107	Set	1	
8	Non-power compensator controlling system	WMJ series	Set	1	□
9	Model, die, core	JZK45/40	Set	2	
10	Transducer for blower	WMJ series	Set	2	□

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined that the renovation production line reaches the following targets.

- a) The output is improved by 25 percent. The rate of acceptance is improved by 10 percent.
- b) The comprehensive energy conservation is 691.81 tce yearly.
- c) The gas emission of CO₂ is reduced 1,724.68 tons.

Comparison of the technical index between renovation before and after sees form 15.

Form 15 Comparison of the technical index between renovation before and after

Name		Unit	Before	After
Output		(Common brick equivalent) × 10,000 bricks/year	2,800	3,500
Rate of acceptance		%	83	93
Perforation	Fired perforated brick	%	23	25
	Fired hollow brick	%	33	37
Coal consumption		kg ce/10,000 bricks (Common brick equivalent)	1,140	950
Electricity consumption		kg ce/10,000 bricks (Common brick equivalent)	71	63

4.3.8 Shenlu New Type Building Materials Co. Ltd, shaanxi

1. Completed contents of engineer design
 - a) Process renovation (Process layout drawing)
 - b) Installation drawing of the following equipments
 - i) Cinder crusher
 - ii) Type $\phi 800 \times 600$ hi-speed fine rolls
 - iii) Type JZK50/45 vacuum extruder
 - c) Repair scheme of original annular kiln was completed. The leak of kiln was repaired. Technology of advanced heat preservation and energy saving was adopted, including using the heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. The kiln roof was removed and rebuilt. The chamber's wickets were repaired. Temperature tester was added for annular kiln.
 - d) Repair schedule of electric equipments

Transducer controlling system was added to kiln blower. Non-power compensator was added to extruder. Electricity conversation compensator was adopted.
2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 16 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 16 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	Dong fang hong -70	Set	1	
2	Hi-speed fine rolls	$\phi 800 \times 600$	Set	1	
3	Cinder crusher	600 × 630	Set	1	
4	Vacuum extruder	JZK50/45-3.0	Set	1	
5	Vertical column and green cutter	QT2000	Set	1	
6	Temperature tester for annular kiln	1200°C	Set	1	
7	Damp and fire core cover	/	Set	38	
8	Blower	ZFJ-8	Set	1	
9	Transducer for blower of kiln	WMJ series	Set	1	
10	Non-power compensator for extruder	WMJ series	Set	1	
11	Model, die, core	JZK50/45-3.0	Set	1	☆

In addition, kiln roof was removed and rebuilt. Damp and fire core cover was changed. Fee for removing and rebuilding kiln roof was invested by UNIDO subsidy fund.

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined to saving 620.96 tce per year, and to reduce gas emissions of CO₂ 1,548.04 tons per year. Comparison of the technical index between renovation before and after sees form 17.

Form 17 Comparison of the technical index between renovation before and after

Index	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	2,200	3,000
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,200	1,020
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	80	56
Rate of acceptance	%	83	93
Perforation	%	22~23, 33~35	26, 45

4.3.9 Shenlufang No.5, Brick Plant, Baqiao District, Xi'an

1. Completed content of engineer design

a) Process layout drawing

b) Installation drawing of the following equipments

i) Type $\phi 800 \times 600$ hi-speed fine rolls

ii) Type SJJ240-36 mixing extruder

iii) Cinder crusher

iiii) Type JZK50/45-3.0 vacuum extruder

c) The repair schedule for the original 38 chambers annular kiln was completed. Temperature tester was added to annular kiln.

d) Repair schedule of electric equipments

1 set of transducer was added to kiln blower. 3 sets of electricity conversation compensator were added to extruder.

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 18 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 18 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	High-speed fine rolls	$\phi 800 \times 600$	Set	1	
2	Cinder crusher	600×630	Set	1	
3	Vertical column and green cutter	QT2000	Set	1	

No.	Name	Type/Model	Unit	Quantity	Remark
4	Mixing extruder	SJJ240-36	Set	1	
5	Vacuum extruder	JZK50/45-3.0	Set	1	
6	Temperature tester for annular kiln	1200□	Set	1	
7	Damp	38 chambers	Set	38	
8	Blower	ZFJ-8	Set	1	
9	Electricity saving compensator	WMJ series	Set	3	
10	Model, die, core	JZK50/45-3.0	Set	1	☆

In addition, kiln roof was removed and rebuilt. Damp and fire core cover was changed. Fee for removing and rebuilding kiln roof was invested by UNIDO subsidy fund.

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined to saving 604.65 tce per year, and to reduce gas emissions of CO₂ 1,507.39 tons per year. Comparison of the technical index between renovation before and after sees form 19.

Form 19 Comparison of the technical index between renovation before and after

Index	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	2,600	2,700
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,100	890
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	56
Rate of acceptance	%	83	93
Perforation	%	22~23, 33~35	26, 45

4.3.10 Shijiadao Hollow Brick Plant

1. Completed content of engineer design

- a) Process layout drawing
- b) Working drawing of annular kiln
- c) Installation drawing of hi-speed fine rolls
- d) Installation drawing of mixing extruder
- e) Installation drawing of cinder crusher
- f) Repair schedule of annular kiln and drainage system of green yard
- g) Renovation schedule of electric equipments

2 sets of transducers were added to kiln blower. 1 set of non-power compensator was added to extruder.

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 20 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 20 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Repair drainage system	20,000	m ²	20,000	
2	Seal the annular kiln	32 chambers	Set	1	☆
3	Rebuild the annular kiln	32 chambers	Set	1	
4	High-speed fine rolls	φ 800×600	Set	1	
5	Double-shaft mixer	SJ3000	Set	1	
6	Transducer for blower	WMJ series	Set	2	☆
7	Non-power compensator for extruder	WMJ series	Set	1	☆
8	Vertical column cutter	QT107	Set	1	
9	Model, die, core	JZK45/40	Set	2	
10	Measure apparatus of caloric value	Type NW	Set	1	
11	Cinder crusher	600×630	Set	1	

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined that the renovation production line reaches the following targets.

- a) The output is improved by 27 percent. The rate of acceptance is improved by 12 percent.
- b) The comprehensive energy conservation is 604.76 tce yearly.
- c) The gas emission of CO₂ is reduced 1,507.67 tons yearly.

Comparison of the technical index between renovation before and after sees form 21.

Form 21 Comparison of the technical index between renovation before and after

Name		Unit	Before	After
Output		(Common brick equivalent) ×10,000 bricks/year	2,200	2,600
Rate of acceptance		%	80	92
Perforation	Fired perforated brick	%	22~23	25
	Fired hollow brick	%	33~35	37
Coal consumption		kg ce/10,000 bricks (Common brick equivalent)	1,200	980
Electricity consumption		kg ce/10,000 bricks (Common brick equivalent)	65	57

4.3.11 Xi'an Oriental Hollow Brick Plant

1. Completed content of engineer design

- a) Process layout drawing
- b) Installation drawing of cinder crusher
- c) Installation drawing of mixing extruder
- d) Installation drawing of rolls
- e) Working drawing of new 24 chambers annular kiln
- f) Repair schedule of electric equipments

4 sets of non-power compensators were added to motor of rolls. 1 set of non-power

compensator was added to mixing extruder and extruder apiece. 2 sets of transducer were added to kiln blower.

g) Repair schedule for the original annular kiln

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 22 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 22 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	W-3	Set	1	
2	Cinder Crusher	600×630	Set	1	
3	Non-power compensator for motor of mills	WMJ	Set	4	
4	Non-power compensator for motor of mixer	WMJ	Set	1	
5	Non-power compensator for motor of Type 45/40 vacuum extruder	WMJ	Set	1	
6	Vertical column cutter	QT2000	Set	1	☆
7	Die	/	Set	2	☆
8	Transducer for exhaust blower	SL-10	Set	2	☆
9	Mills renovation	DW202	Set	1	☆
10	Mixer renovation	DW302	Set	1	☆
11	Measure apparatus of caloric value	Type NW	Set	1	

In addition, drainage system of the green yard and annular kiln was renovated. The new annular kiln was commissioned.

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined to saving 696.95 tce per year, and to reduce gas emissions of CO₂ 1,737.50 tons per year. Comparison of the technical index between renovation before and after sees form 23.

Form 23 Comparison of the technical index between renovation before and after

Name	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	2,490	4,000
Rate of acceptance	%	78	88
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,200	1,050
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	51

4.3.12 Chang'an Xibei Building Plant

1. Completed content of engineer design
 - a) Process layout drawing

- b) Installation drawing of the following equipments
 - i) Type $\phi 800 \times 600$ hi-speed fine rolls
 - ii) Type SJ240-36 strong strength mixer
 - iii) Cinder crusher
 - c) Drawing for new 24 chambers annular kiln production line
 - i) General plat drawing of 24 chambers annular kiln
 - ii) Section drawing
 - d) Repair schedule for the original 22 chambers annular kiln
 - e) Repair schedule of electric equipments

2 sets of transducers were added to kiln blower. 1 set of non-power compensator was added to motor of extruder and mixer apiece. 4 sets of non-power compensators were added to motor of rolls.
2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 24 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 24 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Bulldozer	Dong fang hong -70	Set	1	
2	Strong strength mixer	SJ240-36	Set	1	
3	High-speed fine rolls	$\phi 800 \times 600$	Set	1	
4	Cinder crusher	400 \times 600	Set	1	☆
5	Non-power compensator for motor of mills	WMJ series	Set	4	
6	Non-power compensator for motor of mixer	WMJ series	Set	1	
7	Non-power compensator system for 45/40 extruder	WMJ series	Set	1	
8	Vertical column cutter	QT2000	Set	1	☆
9	Measure apparatus of caloric value	Type NW	Set	1	
10	Transducer for exhaust blower	WMJ series	Set	2	
11	Die renovation	JZK45/40	Set	2	

In addition, roof of the old 22 chambers kiln was removed and rebuilt. Drainage system of the green yard was renovated. Fee for removing and rebuilding the kiln roof was invested by UNIDO subsidy fund.

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined to saving 800.46 tce per year, and to reduce gas emissions of CO₂ 1,995.55 tons per year. Comparison of the technical index between renovation before and after sees form 25.

Form 25 Comparison of the technical index between renovation before and after

Index	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	2,400	3,000
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,150	900
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	54
Rate of acceptance	%	78	92
Perforation	%	22~23, 33~35	26, 40

4.3.13 Xiangfa New Building Materials Co., Xi'an

1. Completed content of engineer design

- a) Process layout drawing
- b) Installation drawing of Type $\phi 800 \times 600$ hi-speed fine rolls
- c) Installation drawing of cinder crusher
- d) Working drawing of new 28 chambers annular kiln
- e) Repair schedule of electric equipments

2 sets of transducers were added to kiln blower. 1 set of non-power compensator was added to extruder.

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 26 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 26 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	W-3	Set	1	☆
2	High-speed fine rolls	$\phi 800 \times 600$	Set	1	
3	Cinder crusher	STS860	Set	1	
4	Non-power compensator for motor of Type 45/40 vacuum extruder	WMJ	Set	1	
5	Vertical column cutter	QT2000	Set	1	
6	Die	/	Set	2	
7	Transducer for exhaust blower	XCJ000	Set	2	☆
8	Measure apparatus of caloric value	Type NW	Set	1	

In addition, drainage system renovation, and construction and commissioning of new annular kiln were completed.

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined to saving 628.15 tce per year, and to reduce gas emissions of CO₂ 1,565.97 tons per year. Comparison of the technical index between renovation before and after sees form 27.

Form 27 Comparison of the technical index between renovation before and after

Name	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	2,300	2,600
Rate of acceptance	%	83	93
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,200	970
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	62

4.3.14 Hongqi St. Xiangyanggou Brick Plant, Baqiao District, Xi'an

1. Completed content of engineer design

- a) Process layout drawing
- b) Installation drawing of hi-speed fine rolls
- c) Installation drawing of mixing extruder
- d) Installation drawing of two-stage vacuum extruder
- e) Installation drawing of cinder crusher
- f) Repair schedule of annular kiln and drainage system of green yard
- g) Renovation schedule of electric equipments

1 set of transducer controlling system was added to kiln blower. 1 set of non-power compensator controlling system was added to extruder.

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 28 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 28 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Repair drainage system	27,000	m ²	27,000	
2	Seal the kiln	40 chambers	Set	1	☆
3	High-speed fine rolls	φ 800×600	Set	1	
4	Strong strength mixing extruder	SJ240-36	Set	1	
5	Two-stage vacuum extruder	JZK50/45	Set	1	
6	Loader	Jiande502	Set	1	
7	Energy conservation blower	ZFJ-8	Set	1	☆
8	Non-power compensator system	WMJ series	Set	1	☆
9	Transducer controlling system for blower of kiln	WMJ series	Set	1	
10	Model, die, core	JZK50/45	Set	2	
11	Vertical column cutter	QT107	Set	1	
12	Measure apparatus of caloric value	Type NW	Set	1	
13	Cinder crusher	600×630	Set	1	

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined that the renovation production line reaches the

following targets.

- a) The output is improved by 12 percent. The rate of acceptance is improved by 12 percent.
- b) The comprehensive energy conservation is 609.29 tce yearly.
- c) The gas emission of CO₂ is reduced 1518.95 tons yearly.

Comparison of the technical index between renovation before and after sees form 29.

Form 29 Comparison of the technical index between renovation before and after

Name		Unit	Before	After
Output		(Common brick equivalent) × 10,000 bricks/year	2,500	2,800
Rate of acceptance		%	80	92
Perforation	Fired perforated brick	%	22~23	25
	Fired hollow brick	%	33~35	37
Coal consumption		kg ce/10,000 bricks (Common brick equivalent)	1,150	940
Electricity consumption		kg ce/10,000 bricks (Common brick equivalent)	63	56

4.3.15 Xinyue Industry and Trade Co. Ltd.

1. Completed content of engineer design

- a) Process layout drawing
- b) Installation drawing of Type $\phi 800 \times 600$ hi-speed fine rolls
- c) Installation drawing of Type JZK45/40 vacuum extruder
- d) Renovation schedule of electric equipments

4 sets of non-power compensator were added to the motor of rolls. 1 set of non-power compensator was added to mixer and extruder apiece. 2 sets of transducer were added to kiln blower.

- e) Repair schedule for the original annular kiln

2. Order, renovation, installation and commissioning of the process equipments and electric equipments listed in Form 30 was completed. All the equipments are running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 30 List of equipments

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	W-3	Set	1	
2	High-speed fine rolls	$\phi 800 \times 600$	Set	1	☆
3	Cinder crusher	STS860	Set	1	
4	Two-stage vacuum extruder	JZK45/40	Set	1	
5	Non-power compensator for mills	GGD	Set	4	
6	Non-power compensator for mixer	GGD	Set	1	
7	Non-power compensator for Type 45/40 vacuum extruder	GGD	Set	1	
8	Transducer for exhaust blower	SL-10	Set	2	☆
9	Measure apparatus of caloric value	Type NW	Set	1	

In addition, drainage system renovation, kiln renovation and commissioning were completed.

3. Comparison of the technical index between renovation before and after

Through running for three months, it is determined to saving 641.64 tce per year, and to reduce gas emissions of CO₂ 1,599.61 tons per year. Comparison of the technical index between renovation before and after sees form 31.

Form 31 Comparison of the technical index between renovation before and after

Name	Unit	Before	After
Output	(Common brick equivalent)×10,000 bricks/year	3,400	4,500
Rate of acceptance	%	80	90
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,230	1,097
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	62

**Certificate of Acceptance of Hollow Brick Plant, Baling Town,
Baqiao District, Xi'an**

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Hollow Brick Plant, Baling Town, Baqiao District, Xi'an". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).
2. Completed installation drawing of newly added equipments
 - 2.1 Cinder crusher
 - 2.2 Type $\phi 800 \times 600$ high speed fine rolls
 - 2.3 Type JZK50/45-3.0 vacuum extruder

3. Proposed repair scheme of original annular kiln. Repaired the kiln body where gas leak off. Adopted advanced heat preservation and energy saving technology including using the heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. Removed kiln top and rebuilt it. Repaired the chamber's wickets. Temperature tester was added for annular kiln.

4. Proposed renovation scheme of electric equipment. Transducer controlling system was added for motor of kiln blower. Non-power compensator controlling system was added for extruder, high speed fine rolls and double shaft mixer. Electricity saving compensator was adopted on-site.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	ZL30PG	Set	1	
2	Hi-speed fine rolls	$\phi 800 \times 600$	Set	1	
3	Cinder Crusher	600×630	Set	1	
4	Non-power compensator for motor of mills	WMJ series	Set	4	☆
5	Non-power compensator for motor of mixer	WMJ series	Set	1	☆
6	Non-power compensator for motor of type 45/40 vacuum extruder	WMJ series	Set	1	☆
7	Vacuum extruder	JZK50/45-3.0	Set	1	
8	Vertical column cutter	QT107	Set	1	
9	Measure apparatus of caloric value	Type NW	Set	1	
10	Transducer for exhaust blower	WMJ series	Set	1	☆
11	Die renovation	JZK50/45-3.0	Set	2	

In addition, the Institute completed drainage system renovation engineer and removing kiln top and rebuilding it. Fee for installing and test-running the equipments listed in form 1 and drainage system renovation was invested by UNIDO subsidy fund.

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

After the energy conversation technical renovation of the original production line completed by Xi'an Research and Design Institute of Wall & Roof Materials and through running for three months, the renovation of our Plant has reached anticipated goals. It is determined to realize saving 707 tons of coal equivalent (tce) per year, and to reduce gas emissions of CO₂ 1762.55 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Index	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	24,00	2,688
Coal consumption	Kg ce /10,000 bricks (Common brick equivalent)	1,250	1,000
Electricity consumption	Kg ce /10,000 bricks (Common brick equivalent)	70	54
Rate of acceptance	%	78	90
Perforation	%	22~23, 33~35	25, 45

Hollow Brick Plant, Baling Town, Baqiao District, Xi'an

By 刘世学
Date 2006. 06. 07

Xi'an Research and Design Institute of Wall & Roof Materials

By 李
Date 2006. 6. 8.

Agriculture Ministry of China Project Management Office

By 王
Date 2006. 7. 7

Certificate of Acceptance of Hongqi New Type Building Materials co., Xi'an

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Hongqi New Type Building Materials co., Xi'an". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical renovation for our Plant.

1. Annular kiln renovation

1.1 Leak of the 24 chambers kiln body was very serious because the brick of the kiln body was destroyed badly. So removed the kiln body and rebuilt it, but kept the basis of the kiln.

1.2 Use asbestos rope and ceramic cotton to airproof the other 24 chambers annular kiln.

2. Green brick yard renovation

Renovated the original green brick yard of this plant. Used fired hollow brick to make hack and increased the height of the hack. The hack width is 0.6m, passage between hack is 1.4m, and hack height is 0.15m. The area is 30,000m².

3. Proposed renovation scheme of electric equipment

1 set of non-power compensator controlling system was added for two-stage vacuum extruder. Two sets of transducer were added for energy conservation blower.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Repair annular kiln	24 chambers	Set	1	
2	Repair green brick yard	35,000	m ³	35,000	☆
3	High-speed fine rolls	φ 800×600	Set	1	
4	Bulldozer and accessory	Dong Fang Hong -70	Set	1	
5	Energy conservation blower and accessory	ZFJ-8	Set	2	☆
6	Accessory	/	Set	5	
7	Damp	/	Set	24	☆
8	Non-power compensator	WMJ series	Set	1	☆
9	Transducer for blower	WMJ series	Set	1	☆
10	Two-stage vacuum extruder	JZK50/45-3.0	Set	1	
11	Vertical column cutter	QT107	Set	1	
12	Temperature tester	1200°C	Set	1	

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

D) Result of the technical renovation

After running for 3 months, the energy conversation technical renovation of the original production line of our Plant completed by Xi'an Research and Design Institute of Wall & Roof Materials has reached following goals.

1. The output is increased 5% and the rate of acceptance is increased 12%.
2. Save 632.98 tons of coal equivalent (tce) per year.
3. Synthetically reduce gas emissions of CO₂ 1578.03 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Name		Unit	Before	After
Output		(Common brick equivalent) × 10,000 bricks/year	4,400	4,600
Rate of acceptance		%	80	92
Perforation	Fired perforated brick	%	23	25
	Fired hollow brick	%	33	37
Coal consumption		kg ce /10,000 bricks (Common brick equivalent)	1,100	970
Electricity consumption		kg ce/10,000 bricks (Common brick equivalent)	61	54

Hongqi New Type Building Materials co., Xi'an

By 李万学

Date 2006年6月07日

Xi'an Research and Design Institute of Wall & Roof Materials

By 李慧

Date 2006.6.8

Agriculture Ministry of China Project Management Office

By 王明合

Date 2006.7.7

Certificate of Acceptance of Hongfang Building Materials Co.

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Hongfang Building Materials Co.". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).
2. Completed installation drawing of newly added equipments
 - 2.1 Cinder crusher
 - 2.2 Type $\phi 800 \times 600$ high speed fine rolls
 - 2.3 Type SJJ240-36 mixing extruder

3. Proposed repair scheme of original annular kiln. Repaired the kiln body where gas leak off. Adopted advanced heat preservation and energy saving technology including using the heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. Removed kiln top and rebuilt it. Repaired the chamber's wickets. Temperature tester was added for annular kiln.

4. Proposed renovation scheme of electric equipment. Transducer was added for motor of kiln blower. Non-power compensator controlling system was added for extruder, hi-speed fine rolls and mixing extruder. Electricity saving compensator on-site was adopted.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	ZL30PG	Set	1	
2	High-speed fine rolls	$\phi 800 \times 600$	Set	1	☆
3	Mixing extruder	SJJ240-36	Set	1	
4	Cinder crusher	600×630	Set	1	
5	Non-power compensator for mills	WMJ series	Set	4	☆
6	Non-power compensator for motor of mixer	WMJ series	Set	1	
7	Non-power compensator system for type 45/40 extruder	WMJ series	Set	1	
8	Vertical column cutter	QT2000	Set	1	
9	Measure apparatus of caloric value	Type NW	Set	1	
10	Transducer for exhaust blower	WMJ series	Set	1	
11	Model, die, core	JZK45/40	Set	2	☆

In addition, the Institute completed drainage system renovation engineer of the green brick

yard, removing kiln top and rebuilding it, and changing damp and fire hole cover. Fee for changing brake and fire hole cover was invested by UNIDO subsidy fund.

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

After the energy conversation technical renovation of the original production line completed by Xi'an Research and Design Institute of Wall & Roof Materials and through running for three months, the renovation of our Plant has reached anticipated goals. It is determined to realize saving 787.19 tons of coal equivalent (tce) per year, and to reduce gas emissions of CO₂ 1962.47 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Index	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	26,00	3,000
Coal consumption	kg ce /10,000 bricks (Common brick equivalent)	1,250	1,000
Electricity consumption	kg ce /10,000 bricks (Common brick equivalent)	70	54
Rate of acceptance	%	78	90
Perforation	%	22~23, 33~35	26, 40

Hongfang Building Materials Co.

By 薛勇
Date 2006.6.7

Xi'an Research and Design Institute of Wall & Roof Materials

By 胡
Date 2006.6.8

Agriculture Ministry of China Project Management Office

By 王
Date 2006.7.7

Certificate of Acceptance of Baling Liucun Brick Plant, Baqiao District, Xi'an

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Baling Liucun Brick Plant, Baqiao District, Xi'an". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical renovation for our Plant.

1. Annular kiln renovation

Repaired the body of the current 38 chambers annular kiln. Removed the kiln cover and rebuilt it and airproofed the kiln.

2. Green brick yard renovation

Renovated the original green brick yard of this plant. Used fired hollow brick to make hack and increased the height of the hack. The hack width is 0.6m, passage between hack is 1.4m, and hack height is 0.15m. The area is 35,000m².

3. Proposed renovation scheme of electric equipment

1 set of non-power compensator controlling system was added for two-stage vacuum extruder.
1 set of transducer was added for energy conservation blower.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Remove kiln cover and rebuild it	38 chambers	Set	1	☆
2	Drainage system renovation	35,000	m ²	35,000	
3	Hi-speed fine rolls	φ 800×600	Set	1	
4	Vacuum extruder	JZK45/40	Set	1	
5	Model, die, core	JZK45/40	Set	1	
6	Vertical column cutter	QT107	Set	1	☆
7	Green cutter	YHQ18-425	Set	1	
8	Bulldozer	Dong Fanghong -70	Set	1	
9	Tube	550mm	Set	2	
10	Gear	M2-5	Set	2	
11	Non-power compensator controlling system	WMJ series	Set	1	☆
12	Energy conservation blower	ZFJ-8	Set	1	☆
13	Measure apparatus of caloric value	Type NW	Set	1	☆
14	Temperature tester of annular kiln	1200°C	Set	1	
15	Transducer for blower	WMJ series	Set	1	☆
16	Conveyor	B500	Set	5	

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

D) Result of the technical renovation

After running for 3 months, the energy conversation technical renovation of the original production line of our Plant completed by Xi'an Research and Design Institute of Wall & Roof Materials has reached following goals.

1. The output is increased 11.7% and the rate of acceptance is increased 10%.
2. Save 611.47 tons of coal equivalent (tce) per year.
3. Synthetically reduce gas emissions of CO₂ 1524.40 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Name		Unit	Before	After
Output		(Common brick equivalent) × 10,000 bricks/year	2,148	2,400
Rate of acceptance		%	83	93
Perforation	Fired perforated brick	%	22~23	25
	Fired hollow brick	%	33~35	37
Coal consumption		kg ce/10,000 bricks (Common brick equivalent)	1,200	950
Electricity consumption		kg ce/10,000 bricks (Common brick equivalent)	71	63

Baling Liucun Brick Plant, Baqiao District, Xi'an

By 张 飞

Date 2006年6月7日

Xi'an Research and Design Institute of Wall & Roof Materials

By 李

Date 2006.6.8.

Agriculture Ministry of China Project Management Office

By 李

Date 2006.7.7

Certificate of Acceptance of Molingmiao Brick Plant

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Molingmiao Brick Plant". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).
2. Completed installation drawing of newly added equipments
 - 2.1 Type $\phi 800 \times 600$ stone-elimination mill crusher
 - 2.2 Type $\phi 800 \times 600$ high speed fine rolls
 - 2.3 Type JZK50/45 vacuum extruder
 - 2.4 Type 3000 double shaft mixer
3. Build a new annular kiln

Completed working drawing of 24 chambers annular kiln. The main indexes of the annular kiln are as follows.

- (1) Product: Clay hollow brick, clay perforated brick
- (2) Arch model: Half circle arch
- (3) Dimension of the chamber: (Width \times height): 4.1 \times 2.7m
- (4) Number of chamber: 24 chambers
- (5) Output daily ($\times 10,000$ bricks): 15 (Ignition in one place)
- (6) Degree of interior burning: 90%
- (7) Capacity of exhaust emission: 46,000m³/h

4. Proposed repair scheme of original annular kiln. Repaired the kiln body where gas leak off. Adopted advanced heat preservation and energy saving technology including using the heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. Removed kiln top and rebuilt it. Repaired the chamber's wickets. Temperature tester was added for annular kiln. Change the old 24 dams by new type damp.

5. Proposed renovation scheme of electric equipment. Transducer controlling system was added for motor of kiln blower. Non-power compensator controlling system was added for extruder.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Stone-elimination mill crusher	$\phi 800 \times 600$	Set	1	
2	Hi-speed fine rolls	$\phi 800 \times 600$	Set	1	
3	Double shaft mixer	SJ3000	Set	1	☆
4	Column cutter	QJ1100	Set	1	
5	Green cutter	YHQ18-425	Set	1	

No.	Name	Type/Model	Unit	Quantity	Remark
6	Two-stage vacuum extruder	JZK50/45	Set	1	
7	Temperature tester for annular kiln	1200°C	Set	1	
8	Damp for annular kiln	/	Set	24	
9	Blower	ZFJ-8	Set	1	
10	Non-power compensator for blower	SL-10	Set	1	☆
11	Non-power compensator for	WMJ series	Set	1	

In addition, the Institute completed drainage system renovation engineer, kiln renovation and test running of new annular kiln.

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

After the energy conversation technical renovation of the original production line completed by Xi'an Research and Design Institute of Wall & Roof Materials and through running for three months, the renovation of our Plant has reached anticipated goals. It is determined to realize saving 638.83 tons of coal equivalent (tce) per year, and to reduce gas emissions of CO₂ 1592.59 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

No.	Unit	Before	After
1	Output (Common brick equivalent) × 10,000 bricks/year	2,000	3,000
2	Coal consumption (kg ce/10,000 bricks (Common brick equivalent))	1,200	1,000
3	Rate of acceptance (year, %)	80	92
4	Perforation (%)	22-23, 33-35	26, 43
5	Electricity consumption (kg ce/10,000 bricks (Common brick equivalent))	60	52

Molingmiao Brick Plant

By 李亚州

Date 2006.6.7

Xi'an Research and Design Institute of Wall & Roof Materials

By 李亚州

Date 2006.6.8

Agriculture Ministry of China Project Management Office

By 李亚州

Date 2006.7.7

Certificate of Acceptance of Qinling Building Materials Co.

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Qinling Building Materials Co.". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).
2. Completed installation drawing of newly added equipments
 - 2.1 Type ϕ 800×600 high speed fine rolls
 - 2.2 Cinder crusher
3. Build a new annular kiln

Completed working drawing of 24 chambers annular kiln. The main indexes of the annular kiln are as follows.

- (1) Product: Clay hollow brick, clay perforated brick
- (2) Arch model: Half circle arch
- (3) Dimension of the chamber: (Width×height): 4.1×2.7m
- (4) Number of chamber: 24 chambers
- (5) Output daily (×10,000 bricks): 15 (Ignition in one place)
- (6) Degree of interior burning: 90%
- (7) Capacity of exhaust emission: 46,000m³/h

4. Proposed repair scheme of original annular kiln. Repaired the kiln body where gas leak off. Adopted advanced heat preservation and energy saving technology including using the heat preservative materials such as rock cotton, cinder and vermiculite to airproof the kiln. Removed kiln top and rebuilt it. Repaired the chamber's wickets.

5. Proposed renovation scheme of electric equipment. Transducer controlling system was added for motor of kiln blower. Non-power compensator controlling system was added for mills, mixer and extruder.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	W-4	Set	1	
2	High-speed fine rolls	ϕ 800×600	Set	1	
3	Cinder crusher	STS865	Set	1	
4	Non-power compensator for mills	WMJ series	Set	4	
5	Non-power compensator for mixer	WMJ series	Set	1	

No.	Name	Type/Model	Unit	Quantity	Remark
6	Non-power compensator for type 45/40 vacuum extruder	WMJ series	Set	1	
7	Vertical column cutter	QJ1100	Set	1	
8	Die	/	Set	2	☆
9	Transducer for exhaust blower	SL-10	Set	2	
10	Measure apparatus of caloric value	Type NW	Set	1	

In addition, the Institute completed drainage system renovation, old annular kiln renovation and test running of new annular kiln. Fee for drainage system renovation was invested by UNIDO subsidy fund.

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

After the energy conversation technical renovation of the original production line completed by Xi'an Research and Design Institute of Wall & Roof Materials and through running for three months, the renovation of our Plant has reached anticipated goals. It is determined to realize saving 633.96 tons of coal equivalent (tce) per year, and to reduce gas emissions of CO₂ 1580.46 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Name	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	2,000	3,000
Rate of acceptance	%	77	87
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,250	1,056
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	54

Qinling Building Materials Co.

By 赵三利

Date 2006.06.07

Xi'an Research and Design Institute of Wall & Roof Materials

By 王强

Date 2006.6.8.

Agriculture Ministry of China Project Management Office

By 王强

Date 2006.7.7

Appendix 7:

Certificate of Acceptance of Shenwei Wall materials Plant, Xi'an

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Shenwei Wall materials Plant, Xi'an". The energy conversation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical renovation for our Plant.

1. Annular kiln renovation

1.1 Leak of the 24 chambers kiln body was very serious because the brick of the kiln body was destroyed badly. So removed the kiln body and rebuilt it.

1.2 Use asbestos rope and ceramic cotton to airproof the other 24 chambers annular kiln.

2. Green brick yard renovation

Renotated the original green brick yard of this plant. Used hollow brick to make hack and increased the height of the hack. The hack width is 0.6m, passage between hack is 1.4m, and hack height is 0.15m. The area is 30,000m².

3. Proposed renovation scheme of electric equipment

1 set of non-power compensator controlling system was added for extruder. Two sets of transducer were added for energy conversation blower.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment list of order, renovation, installation and test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Remove and rebuild annular kiln	24chambers	Set	1	
2	Repair and seal kiln	24chambers	Set	1	☆
3	Green brick yard renovation	30,000	m ²	30,000	
4	High-speed fine rolls	φ 800×600	Set	1	
5	Measure apparatus of caloric value	Type NW	Set	1	
6	Cinder crusher	600×630	Set	2	
7	Vertical column cutter	QT107	Set	1	
8	Non-power compensator controlling system	WMJ series	Set	1	☆
9	Model, die, core	JZK45/40	Set	2	
10	Transducer for blower	WMJ series	Set	2	☆

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

D) Result of the technical renovation

After running for 3 months, the energy conversation technical renovation of the original production line of our Plant completed by Xi'an Research and Design Institute of Wall & Roof Materials has reached following goals.

1. The output is increased 25% and the rate of acceptance is increased 10%.
2. Save 691.81 tons of coal equivalent (tce) per year.
3. Synthetically reduce gas emissions of CO₂ 1724.68 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Name		Unit	Before	After
Output		(Common brick equivalent) × 10,000 bricks/year	2,800	3,500
Rate of acceptance		%	83	93
Perforation	Fired perforated brick	%	23	25
	Fired hollow brick	%	33	37
Coal consumption		kg ce/10,000 bricks (Common brick equivalent)	1,140	950
Electricity consumption		kg ce/10,000 bricks (Common brick equivalent)	71	63

Shenwei Wall materials Plant, Xi'an

By 吴伟民
Date 2006.6.7

Xi'an Research and Design Institute of Wall & Roof Materials

By 李慧
Date 2006.6.8

Agriculture Ministry of China Project Management Office

By 王世金
Date 2006.7.7

Certificate of Acceptance of Shenlu New Type Building Materials Co. Ltd, shaanxi

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Shenlu New Type Building Materials Co. Ltd, shaanxi". The energy conversation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).
2. Completed installation drawing of newly added equipments
 - 2.1 Cinder crusher
 - 2.2 Type $\phi 800 \times 600$ high speed fine rolls
 - 2.3 Type JZK50/45 vacuum extruder

3. Proposed repair scheme of original annular kiln. Repaired the kiln body where gas leak off. Adopted advanced heat preservation and energy saving technology including using the heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. Removed kiln top and rebuilt it. Repaired the chamber's wickets. Temperature tester was added for annular kiln.

4. Proposed renovation scheme of electric equipment. Transducer controlling system was added for motor of kiln blower. Non-power compensator controlling system was added for extruder and double shaft mixer. Electricity saving compensator on-site was adopted.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	Dong fang hong -70	Set	1	
2	Hi-speed fine rolls	$\phi 800 \times 600$	Set	1	
3	Cinder crusher	600×630	Set	1	
4	Vacuum extruder	JZK50/45-3.0	Set	1	
5	Vertical column and green cutter	QT2000	Set	1	
6	Temperature tester for annular kiln	1200°C	Set	1	
7	Damp and fire hole core	/	Set	38	
8	Blower	ZFJ-8	Set	1	
9	Transducer for blower of kiln	WMJ series	Set	1	
10	Non-power compensator for extruder	WMJ series	Set	1	
11	Model, die, core	JZK50/45-3.0	Set	1	☆

**Certificate of Acceptance of Shenlufang No.5, Brick Plant,
Baqiao District, Xi'an**

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Shenlufang No.5, Brick Plant, Baqiao District, Xi'an". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).

2. Completed installation drawing of newly added equipments

2.1 Cinder crusher

2.2 Type $\phi 800 \times 600$ high speed fine rolls

2.3 Type SJJ240-36 mixing extruder

2.4 Type JZK50/45-3.0 vacuum extruder

3. Proposed repair scheme of original annular kiln. Repaired the kiln body where gas leak off. Adopted advanced heat preservation and energy saving technology including using the heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. Removed kiln top and rebuilt it. Repaired the chamber's wickets. Temperature tester was added for annular kiln.

4. Proposed renovation scheme of electric equipment. Transducer controlling system was added for motor of kiln blower. Non-power compensator controlling system was added for extruder and hi-speed fine rolls. Electricity saving compensator on-site was adopted.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	High-speed fine rolls	$\phi 800 \times 600$	Set	1	
2	Cinder crusher	600×630	Set	1	
3	Vertical column and green cutter	QT2000	Set	1	
4	Mixing extruder	SJJ240-36	Set	1	
5	Vacuum extruder	JZK50/45-3.0	Set	1	
6	Temperature tester for annular kiln	1200°C	Set	1	
7	Damp	38 chambers	Set	38	
8	Blower	ZFJ-8	Set	1	
9	Electricity saving compensator	WMJ series	Set	3	
10	Model, die, core	JZK50/45-3.0	Set	1	☆

In addition, the Institute completed removing kiln top and rebuilding it and changing damp and fire hole cover. Fee for removing kiln top and rebuilding it was invested by UNIDO subsidy fund.

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

After the energy conversation technical renovation of the original production line completed by Xi'an Research and Design Institute of Wall & Roof Materials and through running for three months, the renovation of our Plant has reached anticipated goals. It is determined to realize saving 604.65 tons of coal equivalent (tce) per year, and to reduce gas emissions of CO₂ 1507.39 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Index	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	2,600	2,700
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,100	890
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	56
Rate of acceptance	%	83	93
Perforation	%	22~23, 33~35	26, 45

Shenlufang No.5, Brick Plant, Baqiao District, Xi'an

By 岑孝宁
Date 2006.6.7

Xi'an Research and Design Institute of Wall & Roof Materials

By [Signature]
Date 2006.6.8

Agriculture Ministry of China Project Management Office

By [Signature]
Date 2006.7.7

Appendix 10:

Certificate of Acceptance of Shijiadao Hollow Brick Plant

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Shijiadao Hollow Brick Plant". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical renovation for our Plant.

1. Annular kiln renovation

1.1 Leak of the 32 chambers kiln body was very serious because the brick of the kiln body was destroyed badly. So kept the basis, removed the kiln body and rebuilt it.

1.2 Used the sealing materials such as asbestos rope and ceramic cotton to airproof the other 32 chambers annular kiln.

2. Green brick yard renovation

Renovated the original green brick yard of this plant. Used fired hollow brick to make hack and increase the height of the hack. The hack width is 0.6m, passage between hack is 1.4m, and hack height is 0.15m. The area is 20,000m².

3. Proposed renovation scheme of electric equipment

2 sets of non-power compensator controlling system was added for two-stage vacuum extruder. 1 set of transducer was added for energy conversation blower.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment list of order, renovation, installation and test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Repair drainage system	20,000	m ²	20,000	
2	Seal the annular kiln	32 chambers	Set	1	☆
3	Rebuild the annular kiln	32 chambers	Set	1	
4	High-speed fine rolls	φ 800×600	Set	1	
5	Double-shaft mixer	SJ3000	Set	1	
6	Transducer for blower	WMJ series	Set	2	☆
7	Non-power compensator for extruder	WMJ series	Set	1	☆
8	Vertical column cutter	QT107	Set	1	
9	Model, die, core	JZK45/40	Set	2	
10	Measure apparatus of caloric value	Type NW	Set	1	
11	Cinder crusher	600×630	Set	1	

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

D) Result of the renovation

After running for 3 months, the energy conversation technical renovation of the original production line of our Plant completed by Xi'an Research and Design Institute of Wall & Roof Materials has reached following goals.

1. The output is increased 18% and the rate of acceptance is increased 12%.
2. Save 604.76 tons of coal equivalent (tce) per year.
3. Synthetically reduce gas emissions of CO₂ 1507.67 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Name		Unit	Before	After
Output		(Common brick equivalent) × 10,000 bricks/year	2,200	2,600
Rate of acceptance		%	80	92
Perforation	Fired perforated brick	%	22~23	25
	Fired hollow brick	%	33~35	37
Coal consumption		Kg ce/10,000 bricks (Common brick equivalent)	1,200	980
Electricity consumption		Kg ce/10,000 bricks (Common brick equivalent)	65	57

Shijiadao Hollow Brick Plant

By 石宝利
Date 2006.6.7

Xi'an Research and Design Institute of Wall & Roof Materials

By 王峰
Date 2006.6.8

Agriculture Ministry of China Project Management Office

By 王峰
Date 2006.7.7

Certificate of Acceptance of Xi'an Oriental Hollow Brick Plant

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Xi'an Oriental Hollow Brick Plant". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).
2. Completed installation drawing of newly added equipments
 - 2.1 Cinder crusher
 - 2.2 Mixing-extruder
 - 2.3 Rolls
3. Build a new annular kiln

Completed working drawing of 24 chambers annular kiln. The main indexes of the annular kiln are as follows.

- (1) Product: Clay hollow brick, clay perforated brick
- (2) Arch model: Half circle arch
- (3) Dimension of the chamber: (Width×height): 4.1×2.7m
- (4) Number of chamber: 24 chambers
- (5) Output daily (×10,000 bricks): 15 (Ignition in one place)
- (6) Degree of interior burning: 90%
- (7) Capacity of exhaust emission: 46,000m³/h

4. Proposed repair scheme of original annular kiln. Repaired the kiln body where gas leak off. Adopted advanced heat preservation and energy saving technology including using the heat preservative materials such as rock cotton, cinder and vermiculite to airproof the kiln. Removed kiln top and rebuilt it. Repaired the chamber's wickets.

5. Proposed renovation scheme of electric equipment. Transducer controlling system was added for motor of kiln blower. Non-power compensator controlling system was added for rolls, mixer and extruder.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	W-3	Set	1	
2	Cinder Crusher	600×630	Set	1	
3	Non-power compensator for motor of mills	WMJ	Set	4	
4	Non-power compensator for motor of mixer	WMJ	Set	1	

No.	Name	Type/Model	Unit	Quantity	Remark
5	Non-power compensator for motor of type 45/40 vacuum extruder	WMJ	Set	1	
6	Vertical column cutter	QT2000	Set	1	☆
7	Die	/	Set	2	☆
8	Transducer for exhaust blower	SL-10	Set	2	☆
9	Mills renovation	DW202	Set	1	☆
10	Mixer renovation	DW302	Set	1	☆
11	Measure apparatus of caloric value	Type NW	Set	1	

In addition, the Institute completed drainage system renovation, kiln renovation and construction and test running of new annular kiln.

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

After the energy conversation technical renovation of the original production line completed by Xi'an Research and Design Institute of Wall & Roof Materials and through running for three months, the renovation of our Plant has reached anticipated goals. It was determined to realize saving 600 tons of coal equivalent (tce) and reducing emissions of CO₂ 1737.50 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Name	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	2,490	4,000
Rate of acceptance	%	78	88
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,200	1,050
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	51

Xi'an Oriental Hollow Brick Plant

By 汪清

Date 2006.6.7

Xi'an Research and Design Institute of Wall & Roof Materials

By 李慧

Date 2006.6.8

Agriculture Ministry of China Project Management Office

By 李慧

Date 2006.7.7

Certificate of Acceptance of Chang'an Xibei Building Plant

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1)– Technical Renovation for Chang'an Xibei Building Plant". The energy conversation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).
2. Completed installation drawing of newly added equipments
 - 2.1 Cinder crusher
 - 2.2 Type $\phi 800 \times 600$ high speed fine rolls
 - 2.3 Type SJJ240-36 mixing extruder
3. Build a new annular kiln

Completed working drawing of 24 chambers annular kiln. The main indexes of the annular kiln are as follows.

- (1) Product: Clay hollow brick, clay perforated brick
- (2) Arch model: Half circle arch
- (3) Dimension of the chamber: (Width \times height): 4.1 \times 2.7m
- (4) Number of chamber: 24 chambers
- (5) Output daily ($\times 10,000$ bricks): 15 (Ignition in one place)
- (6) Degree of interior burning: 90%
- (7) Capacity of exhaust emission: 46,000m³/h

4. Proposed repair scheme of original annular kiln. Repaired the kiln body where gas leak off. Adopted advanced heat preservation and energy saving technology including using the heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. Removed kiln top and rebuilt it. Repaired the chamber's wickets. Temperature tester was added for annular kiln.

5. Proposed renovation scheme of electric equipment. Transducer was added for motor of kiln blower. Non-power compensator controlling system was added for extruder, mills and mixer. Electricity saving compensator on-site was adopted.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Bulldozer	Dong fang hong -70	Set	1	
2	Strong strength mixer	SJ240-36	Set	1	
3	High-speed fine rolls	$\phi 800 \times 600$	Set	1	
4	Cinder crusher	400 \times 600	Set	1	☆
5	Non-power compensator for motor of mills	WMJ series	Set	4	

No.	Name	Type/Model	Unit	Quantity	Remark
6	Non-power compensator for motor of mixer	WMJ series	Set	1	
7	Non-power compensator system for 45/40 extruder	WMJ series	Set	1	
8	Vertical column cutter	QT2000	Set	1	☆
9	Measure apparatus of caloric value	Type NW	Set	1	
10	Transducer for exhaust blower	WMJ series	Set	2	
11	Die renovation	JZK45/40	Set	2	

In addition, the Institute completed drainage system renovation engineer of the green brick yard, removing kiln top of the old 22 chambers kiln and rebuilding it. Fee for removing and rebuilding the kiln top was invested by UNIDO subsidy fund.

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

After the energy conversation technical renovation of the original production line completed by Xi'an Research and Design Institute of Wall & Roof Materials and through running for three months, the renovation of our Plant has reached anticipated goals. It is determined to realize saving 800.46 tons of coal equivalent (tce) per year, and to reduce gas emissions of CO₂ 1995.55 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Index	Unit	Before	After
Output	(Common brick equivalent) × 10,000 bricks/year	2,400	3,000
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,150	900
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	54
Rate of acceptance	%	78	92
Perforation	%	22~23, 33~35	26, 40

Chang'an Xibei Building Plant

By 李承祖

Date 2006.6.7

Xi'an Research and Design Institute of Wall & Roof Materials

By 肖慧

Date 2006.6.8

Agriculture Ministry of China Project Management Office

By 王为民

Date 2006.7.7

Certificate of Acceptance of Xiangfa New Building Materials Co., Xi'an

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Xiangfa New Building Materials Co., Xi'an". The energy conversation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).
2. Completed installation drawing of newly added equipments
 - 2.1 Type $\phi 800 \times 600$ high speed fine rolls
 - 2.2 Cinder crusher
3. Build a new annular kiln

Completed working drawing of 28 chambers annular kiln. The main indexes of the annular kiln are as follows.

- (1) Product: Clay hollow brick, clay perforated brick
- (2) Arch model: Half circle arch
- (3) Dimension of the chamber: (Width \times height): 4.1 \times 2.7m
- (4) Number of chamber: 28 chambers
- (5) Output daily ($\times 10,000$ bricks): 15 (Ignition in one place)
- (6) Degree of interior burning: 90%
- (7) Capacity of exhaust emission: 46,000m³/h

4. Proposed renovation scheme of electric equipment. Transducer controlling system was added for motor of kiln blower. Non-power compensator controlling system was added for extruder.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	W-3	Set	1	☆
2	High-speed fine rolls	$\phi 800 \times 600$	Set	1	
3	Cinder crusher	STS860	Set	1	
4	Non-power compensator for motor of type 45/40 vacuum extruder	WMJ	Set	1	
5	Vertical column cutter	QT2000	Set	1	
6	Die	/	Set	2	
7	Transducer for exhaust blower	XCJ000	Set	2	☆
8	Measure apparatus of caloric value	Type NW	Set	1	

In addition, the Institute completed drainage system renovation and construction and test

running of new annular kiln.

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

After the energy conversation technical renovation of the original production line completed by Xi'an Research and Design Institute of Wall & Roof Materials and through running for three months, the renovation of our Plant has reached anticipated goals. It is determined to realize saving 628.15 tons of coal equivalent per year, and to reduce gas emissions of CO₂ 1565.97 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Name	Unit	Before	After
Output	(Common brick equivalent) × 10 ⁴ bricks/year	2,300	2,600
Rate of acceptance	%	83	93
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,200	970
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	62

Xiangfa New Building Materials Co., Xi'an

By 任选昆

Date 2006.06.07

Xi'an Research and Design Institute of Wall & Roof Materials

By 王慧

Date 2006.6.8.

Agriculture Ministry of China Project Management Office

By 王慧

Date 2006.7.7

Appendix 14:

**Certificate of Acceptance of Hongqi St. Xiangyanggou Brick Plant,
Baqiao District, Xi'an**

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Hongqi St. Xiangyanggou Brick Plant, Baqiao District, Xi'an". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical renovation for our Plant.

1. Annular kiln renovation

Use the sealing materials such as asbestos rope and ceramic cotton to airproof the other 40 chambers annular kiln.

2. Drainage system renovation

Renovated the original green brick yard of this plant. Used fired hollow brick to make hack and increased the height of the hack. The hack width is 0.6m, passage between hack is 1.4m, and hack height is 0.15m. The area is 27,000m².

3. Proposed renovation scheme of electric equipment

1 set of non-power compensator controlling system was added for two-stage vacuum extruder.
1 set of transducer was added for energy conservation blower.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment list of order, renovation, installation and test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Repair drainage system	27,000	m ²	27,000	
2	Seal the kiln	40 chambers	Set	1	☆
3	High-speed fine rolls	φ 800×600	Set	1	
4	Strong strength mixing extruder	SJ240-36	Set	1	
5	Two-stage vacuum extruder	JZK50/45	Set	1	
6	Loader	Jiande502	Set	1	
7	Energy conservation blower	ZFJ-8	Set	1	☆
8	Non-power compensator system	WMJ series	Set	1	☆
9	Transducer controlling system for blower of kiln	WMJ series	Set	1	
10	Model, die, core	JZK50/45	Set	2	
11	Vertical column cutter	QT107	Set	1	
12	Measure apparatus of caloric value	Type NW	Set	1	
13	Cinder crusher	600×630	Set	1	

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

D) Result of the renovation

After running for 3 months, the energy conversation technical renovation of the original production line of our Plant completed by Xi'an Research and Design Institute of Wall & Roof Materials has reached following goals.

1. The output is increased 12% and the rate of acceptance is increased 12%.
2. Save 609.29 tons of coal equivalent (tce) per year.
3. Synthetically reduce gas emissions of CO₂ 1518.95 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Name		Unit	Before	After
Output		(Common brick equivalent) × 10,000 bricks/year	2,500	2,800
Rate of acceptance		%	80	92
Perforation	Fired perforated brick	%	22~23	26~27
	Fired hollow brick	%	33~35	40~45
Coal consumption		kg ce/10,000 bricks (Common brick equivalent)	1,150	940
Electricity consumption		kg ce/10,000 bricks (Common brick equivalent)	63	56

Hongqi St. Xiangyanggou Brick Plant, Baqiao District, Xi'an

By 李合斌
Date 2006.6.7

Xi'an Research and Design Institute of Wall & Roof Materials

By 李合斌
Date 2006.6.8

Agriculture Ministry of China Project Management Office

By 王金山
Date 2006.7.7

Certificate of Acceptance of Xinyue Industry and Trade Co. Ltd.

Xi'an Research and Design Institute of Wall & Roof Materials completed the prescriptive task of the UNIDO Contract and TOR of the project entitled "Energy Conservation and GHG Emissions Reduction in Chinese TVEs (Phase II) – Brick Sector Replication Project for Energy Efficiency (1) – Technical Renovation for Xinyue Industry and Trade Co. Ltd.". The energy conservation technical renovation of our Plant achieves the anticipated target.

A) Xi'an Research and Design Institute of Wall & Roof Materials completed the following technical design for our Plant.

1. Completed process renovation (process layout drawing).
2. Completed installation drawing of newly added equipments

2.1 Cinder crusher

2.2 Type $\phi 800 \times 600$ high speed fine rolls

2.3 Type JZK45/40-30 vacuum extruder

3. Proposed repair scheme of original annular kiln. Repaired the kiln body where gas leak off. Adopted advanced heat preservation and energy saving technology including using the heat preservation materials such as rock cotton, cinder and vermiculite to airproof the kiln. Removed kiln top and rebuilt it. Repaired the chamber's wickets.

4. Proposed renovation scheme of electric equipment. Transducer controlling system was added for motor of kiln blower. Non-power compensator controlling system was added for mills, mixer and extruder.

B) Completed order, renovation, installation and test-running of the process equipments and electric equipments listed in Form 1. All the equipments is running well (☆ indicates the equipment or item invested by UNIDO subsidy fund).

Form 1 Equipment List of Order, Renovation, Installation and Test-running

No.	Name	Type/Model	Unit	Quantity	Remark
1	Excavator	W-3	Set	1	
2	High-speed fine rolls	$\phi 800 \times 600$	Set	1	☆
3	Cinder crusher	STS860	Set	1	
4	Two-stage vacuum extruder	JZK45/40	Set	1	
5	Non-power compensator for mills	GGD	Set	4	
6	Non-power compensator for mixer	GGD	Set	1	
7	Non-power compensator for type 45/40 vacuum extruder	GGD	Set	1	
8	Transducer for exhaust blower	SL-10	Set	2	☆
9	Measure apparatus of caloric value	Type NW	Set	1	

In addition, the Institute completed drainage system renovation engineer, kiln renovation and test running.

C) Completed technical and management technology training of relevant post

During the construction, the Institute developed technical and management training for the personnel in relevant working post, helped our Plant set up suitable management system, provided full and detailed consultative and technical service.

After the energy conversation technical renovation of the original production line completed by Xi'an Research and Design Institute of Wall & Roof Materials and through running for three months, the renovation of our Plant has reached anticipated goals. It is determined to realize saving 641.64 tons of coal equivalent (tce) per year, and to reduce gas emissions of CO₂ 1599.61 tons per year.

Comparing between renovation before and after see form 2.

Form 2 Comparing Between Renovation Before and After

Name	Unit	Before	After
Output	(Common brick equivalent) × 10 ⁴ bricks/year	3,400	4,500
Rate of acceptance	%	80	90
Coal consumption	kg ce/10,000 bricks (Common brick equivalent)	1,230	1,097
Electricity consumption	kg ce/10,000 bricks (Common brick equivalent)	70	62

Xinyue Industry and Trade Co. Ltd.

By 张园选

Date 2006.6.7

Xi'an Research and Design Institute of Wall & Roof Materials

By 王培

Date 2006.6.8.

Agriculture Ministry of China Project Management Office

By 王培

Date 2006.7.7

M & E Form: Brick-making Subsector Replication Project

No.	TYPE	Business Profile	Technical Process and Major Energy-use Equipments	E E Baseline							Proposed Technical Renovation	Project Investment			Project Status	Start-end date	Anticipated Results				Remarks				
				Energy Type	Energy consumption (physical quantity)	Conversion Factor	Energy use (tce)	Energy Use/Unit Product	Output Before Renovation	Total energy use (tce)		CO2 Coefficient	CO2 Emissions (t/a.)	Total (RMB ¥ 10,000)			GEF (US\$)	Others (RMB ¥ 10,000)	Financial Evaluation	Production after renovation		Energy Use/Unit Product	Energy Savings (tce/a.)	CO2 emission Reduction (t/a.)	
1	Hollow Brick Plant, Baqing Town, Baqing District, Xi'an	This plant was established as a collectively owned plant in the 1980s. It occupies an area of over 80 mu (1 mu = 1/15 hectare). Prior to the project, the plant has fixed assets of 1 million RMB Yuan and produces an annual output of 24 million bricks (common brick equivalent). While it has fixed assets of 1.52 million RMB Yuan and produces an annual output of 26.88 million bricks (common brick equivalent) after renovation. At present, the plant employs 100 people including 8 technicians and the salary is 870 RMB Yuan/month on average. The main raw material is clay and cinder. The two main products are fired perforated brick (module 240-115-90) and fired hollow brick (module 240-240-115). The price of the perforated is 0.36 RMB Yuan/piece and the perforation rate is over 25%. The price of the hollow is 1.00 RMB Yuan/piece and the perforation rate is over 45%. As a result of renovation, brick quality improved and the acceptance rate increases from 78% to 90%. Most of the products are sold on the local market in Xi'an.	Production process and equipments: Cinder crusher—coarse rolls—hi-speed fine rolls—mixer—vacuum extruder—vertical column cutter—green brick cutter—natural drying—firing in annular kiln The main energy consumption equipments 1) The repaired 38 chambers annular kiln 2) Cinder crusher 3) Hi-speed fine rolls 4) Mixer 5) Vacuum extruder 6) Column cutter 7) Green brick cutter 8) Exhaust blower	Internal combu- stive coal (t) 2700.00 External combu- stive coal (t) 2160.00 Power/MWh 432.00	0.196 0.733 0.383	1411.20 1,583.28 165.46	Coal: 1.25 tce/10,000 bce Power: 0.07 tce/10,000 bce	2,400 10,000 bce/a	3,159.94	2,493	7,877.72	1) Kiln renovation The 38 chambers annular kiln was sooted. The surface backfilling of the annular kiln was carried away and the leaking fire and arch roof was repaired and tamped. 2) Equipment renovation a) Purchase a set of new excavator. Install and debug the equipments including cinder crusher, hi-speed fine rolls, vacuum extruder and vertical column cutter. b) Die installation and commissioning 3) Electric equipment renovation 4) Drainage system of green brick yard renovation 5) Staff training	Commercial loan Entrustment Loan Self-Funding 41.76920	51.6932	12,000.00	Financial Assistance	The renovation project had been completed according to the technical plan.	2005.03.10 ~ 2005.08.31	Payback period IRR NPV 2.61 46.01 76.63 ¥10,000	103.70 ¥1/tce	2,688 10,000 common bricks/a	Coal: 1.000 tce/10,000 bce Power: 0.054 tce/10,000 bce C energy consumption 1.05 tce/10,000 bce	707.00	1,762.55	1) The baseline year is in 2004. 2) The data in Business Profile column comes from field investigation. 3) Physical quantity of energy consumption comes from the Feasibility Report. 4) Conversion factor is derived from formula, that is Conversion factor = Factual calorific value of fuel/Calorific value of coal equivalent. 5) Total investment and GEF comes from the Installation and Commissioning Report. 6) Payback period, IRR and NPV is calibrated on the basic data after renovation. 7) Energy consumption of unit product comes from actual determination.
2	Hongqi New Type Building Materials, Xi'an	This plant was established as a collectively owned plant in the 1980s. It occupies an area of over 120 mu (1 mu = 1/15 hectare). Prior to the project, the plant has fixed assets of 1.1 million RMB Yuan and produces an annual output of 44 million bricks (common brick equivalent). While it has fixed assets of 1.68 million RMB Yuan and produces an annual output of 46 million bricks (common brick equivalent) after renovation. At present, the plant employs 100 people including 10 technicians and the salary is 850 RMB Yuan/month on average. The main raw material is clay and coal. The two main products are fired perforated brick (module 240-115-90) and fired hollow brick (module 240-240-115). The price of the perforated is 0.40 RMB Yuan/piece and the perforation rate is over 25%. The price of the hollow is 1.00 RMB Yuan/piece and the perforation rate is over 37%. As a result of renovation, brick quality improved and the acceptance rate increases from 80% to 92%. Most of the products are sold on the local market in Xi'an.	Production process and equipments: Boxing feeder—roll crusher—hi-speed fine rolls—double shaft mixer—two-stage vacuum extruder—column cutter—green cutter—adobe transporting machine—natural drying—firing in annular kiln The main energy consumption equipments 1) New 38 chambers annular kiln 2) Boxing feeder 3) Cinder crusher 4) Roll crusher 5) Hi-speed fine rolls 6) Double shaft mixer 7) Two-stage vacuum extruder 8) Column cutter 9) Green brick cutter 10) Blower	Internal combu- stive coal (t) 16940.00 External combu- stive coal (t) 704.00 Power/MWh 704.00	0.29 0.383	4839.76 269.63	Coal: 1.10 tce/10,000 bce Power: 0.061 tce/10,000 bce	4,400 10,000 bce/a	5,109.39	2,493	12,737.71	1) Renewing process equipment 1 set of Type Φ800-600 hi-speed fine rolls was introduced. The Type JZK450 vacuum extruder is replaced with a Type JZK500 two-stage vacuum extruder. Replace the original column cutter with the vertical column cutter to reduce wasted column by 10%. 2) Annular kiln renovation The 24 chambers annular kiln was repaired. The arch wall of the kiln was repaired, while the vertical wall was kept. The old damp was changed with new type-1 set of type ZFJ-8 blower was introduced. The drainage system was repaired through increasing height of back to reduce loss of adobe when rainy weather or heavy rain. 3) Electric equipments renovation Non-power compensator was added to extruder. Transducer was added to kiln blower.	Commercial loan Entrustment Loan Self-Funding 47.77160	57.6956	12,000.00	Financial Assistance	The renovation project had been completed according to the technical plan.	2005.03.10 ~ 2005.08.31	Payback period IRR NPV 1.94 60.50 126.14 ¥10,000	135.89 ¥1/tce	4,600 10,000 common bricks/a	Coal: 0.97 tce/10,000 bce Power: 0.054 tce/10,000 bce C energy consumption 1.02 tce/10,000 bce	632.98	1,578.03	1) The baseline year is in 2004. 2) The data in Business Profile column comes from field investigation. 3) Physical quantity of energy consumption comes from the Feasibility Report. 4) Conversion factor is derived from formula, that is Conversion factor = Factual calorific value of fuel/Calorific value of coal equivalent. The plant uses the poor coal with low calorific value. 5) Total investment and GEF comes from the renovated actual data. 6) Payback period, IRR and NPV is calibrated on the basic data after renovation. 7) Energy consumption of unit product comes from the Feasibility Report.

5	Molin Brick Plant	This plant was established as a collectively owned plant in 1974. It occupies an area of over 100 mu (1mu=1/15 hectare). Prior to the project, the plant has fixed assets of 1.07 million RMB Yuan and produces an annual output of 20 million bricks (common brick equivalent). While it has fixed assets of 1.92 million RMB Yuan and produces an annual output of 30 million bricks (common brick equivalent) after renovation. At present, the plant employs 105 people including 9 technical people and the salary is 860 RMB Yuan/month on average. The main raw material is clay and cinder. The two main products are fired perforated brick (module 240*115*90) and fired hollow brick (module 240*240*115). The price of the perforated is 0.36 RMB Yuan/piece and the perforation rate is over 26%. The price of the hollow is 0.93 RMB Yuan/piece and the perforation rate is over 43%. As a result of renovation, brick quality improved and the acceptance rate increases from 80% to 90%. Most of the products are sold on the local market in Xian.	Production process and equipments: Cinder crusher + boxing feeder -- stone-elimination rolls -- hi-speed fine rolls -- Double shaft mixer -- vacuum extruder -- column cutter -- green brick cutter -- natural drying -- firing in annular kiln The main energy consumption equipments: 1) New 24 chambers annular kiln and the repaired 24 chambers annular kiln 2) Stone-elimination rolls 3) Hi-speed fine rolls 4) Double shaft mixer 5) Vacuum extruder 6) Column cutter 7) Green brick cutter 8) Energy conversion blower	Internal combative coal (t)	5100.00	0.196	999.60	Coal: 1.20 tce/10,000 bce	2,000	10,000 bce/a	2,530.06	2,493	6,307.44	85.3175	12,000.00	Commercial Loan	Entrustment Loan	Self-Funding	75,393.50	The renovation project had been completed according to the technical plan.	2005.03.10 -- 2005.08.31	Payback period	2.47 year	IRR	48.36 %	NPV	136.09 Y10,000	Cost of energy saving	210.5 Y1/tce	10,000 common bricks/a	3,000	C energy consumption	1.05 tce/10,000 bce	638.83	1,592.59	1)The baseline year is in 2004. 2)The data in Business Profile column comes from field investigation. 3)Physical quantity of energy consumption comes from the Feasibility Report. 4)Conversion factor is derived from formula, that is Conversion factor = Factual calorific value of fuel / Calorific value of coal equivalent. 5)Total investment and GEF comes from the Installation and Commissioning Report. 6)Payback period, IRR and NPV is calibrated on the basic data after renovation. 7)Energy consumption of unit product comes from actual determination.
				External combative coal (t)	1950.00	0.722	1,407.90	Power: 0.06 tce/10,000 bce																												
				Power/MWh	320.00	0.383	122.56																													

6	Qingling Building Material Co.	This plant was established as a collectively owned plant in 1980. It occupies an area of over 96 mu (1mu=1/15 hectare). Prior to the project, the plant has fixed assets of 0.87 million RMB Yuan and produces an annual output of 20 million bricks (common brick equivalent). While it has fixed assets of 1.37 million RMB Yuan and produces an annual output of 30 million bricks (common brick equivalent) after renovation. At present, the plant employs 95 people including 7 technical people and the salary is 930 RMB Yuan/month on average. The main raw material is clay and coal. The two main products are fired perforated brick (module 240*115*90) and fired hollow brick (module 240*240*115). The price of the perforated is 0.37 RMB Yuan/piece and the perforation rate is over 26%. The price of the hollow is 1.00 RMB Yuan/piece and the perforation rate is over 45%. As a result of renovation, brick quality improved and the acceptance rate increases from 77% to 87%. Most of the products are sold on the local market in Xian.	Production process and equipments: Cinder crusher + boxing feeder -- hi-speed fine rolls -- mixer -- vacuum extruder -- vertical column cutter -- green brick cutter -- natural drying -- firing in annular kiln The main energy consumption equipments: 1) New 24 chambers annular kiln and the repaired 28 chambers annular kiln 2) Cinder crusher 3) Hi-speed rolls 4) Mixer 5) Vacuum extruder 6) Vertical column cutter 7) Green brick cutter 8) Exhausted blower	Internal combative coal (t)	6500.00	0.196	1,274.00	Coal: 1.25 tce/10,000 bce	2,000	10,000 bce/a	2,641.88	2,493	6,586.21	49.9706	12,000.00	Commercial Loan	Entrustment Loan	Self-Funding	40,046.60	The renovation project had been completed according to the technical plan.	2005.03.10 -- 2005.08.31	Payback period	1.37 year	IRR	84.01 %	NPV	167.65 Y10,000	Cost of energy saving	114.70 Y1/tce	10,000 common bricks/a	3,000	C energy consumption	1.11 tce/10,000 bce	633.96	1,580.45	1)The baseline year is in 2004. 2)The data in Business Profile column comes from field investigation. 3)Physical quantity of energy consumption comes from the Feasibility Report. 4)Conversion factor is derived from formula, that is Conversion factor = Factual calorific value of fuel / Calorific value of coal equivalent. 5)Total investment and GEF comes from the Installation and Commissioning Report. 6)Payback period, IRR and NPV is calibrated on the basic data after renovation. 7)Energy consumption of unit product comes from actual determination.
				External combative coal (t)	1640.00	0.750	1,230.00	Power: 0.07 tce/10,000 bce																												
				Power/MWh	360.00	0.383	137.88																													

9	Shaping No. 5 Brick Plant, Baqiao District, Xian	<p>This plant was established as a small privately owned plant in 1981. It occupies an area of over 120 mu (1 mu=1/15 hectare). Prior to the project, the plant has fixed assets of 0.97 million RMB Yuan and produces an annual output of 26 million bricks (common brick equivalent). While it has fixed assets of 1.47 million RMB Yuan and produces an annual output of 27 million bricks (common brick equivalent) after renovation. At present, the plant employs 96 people including 8 technical people and the salary is 900 RMB Yuan/month on average. The main raw material is clay and coal. The two main products are fired perforated brick (module 240·115·90) and fired hollow brick (module 240·240·115). The price of the perforated is 0.38 RMB Yuan/piece and the perforation rate is over 26%. The price of the hollow is 1.00 RMB Yuan/piece and the perforation rate is over 45%. As a result of renovation, brick quality improved and the acceptance rate increases from 83% to 93%. Most of the products are sold on the local market in Xian.</p>	<p>Production process and equipments: Cinder crusher— Boxing feeder— Hi-speed fine rolls— Mixing extruder— Vacuum extruder— Column cutter— Green brick cutter— Natural drying— Firing in annular kiln</p> <p>The main energy consumption equipments 1)The repaired 38 chambers annular kiln 2)Cinder crusher 3)Hi-speed fine rolls 4)Mixing extruder 5)Vacuum extruder 6)Column cutter 7)Green brick cutter 8)Blower</p>	Internal combustive coal (t)	5900.00	0.196	1,156.40	Coal: 1.10 tce/10,000 bce	2,600	10,000 bce/a.	3,040.64	2.493	7,580.33	50.9854	12,000.00	Financial Assistance	The renovation project had been completed according to the technical plan.	2005.03.10 ~ 2005.08.31	Cost of energy saving	124.70	¥1/tce	2,700	10,000 common bricks/a.	604.65	1,507.39	<p>1)The baseline year is in 2004 2)The data in Business Profile column comes from field investigation. 3)Physical quantity of energy consumption comes from the Feasibility Report. 4)Conversion factor is derived from formula, that is Conversion factor = Factual calorific value of fuel/ Calorific value of coal equivalent. 5)Total investment and GEF comes from the Installation and Commissioning Report. 6)Payback period, IRR and NPV is calibrated on the basic data after renovation. 7)Energy consumption of unit product comes from the actual determination.</p>
				External combustive coal (t)	2500.00	0.682	1,705.00	Power: 0.07 tce/10,000 bce																		
				Power/MWh	468.00	0.383	179.24																			

10	Shaping No. 10 Hollow Brick Plant	<p>This plant was established as a small privately owned plant in 1980s. It occupies an area of over 87 mu (1 mu=1/15 hectare). Prior to the project, the plant has fixed assets of 1.25 million RMB Yuan and produces an annual output of 22 million bricks (common brick equivalent). While it has fixed assets of 1.76 million RMB Yuan and produces an annual output of 26 million bricks (common brick equivalent) after renovation. At present, the plant employs 108 people including 8 technical people and the salary is 980 RMB Yuan/month on average. The main raw material is clay and coal. The two main products are fired perforated brick (module 240·115·90) and fired hollow brick (module 240·240·115). The price of the perforated is 0.40 RMB Yuan/piece and the perforation rate is over 25%. The price of the hollow is 1.00 RMB Yuan/piece and the perforation rate is over 37%. As a result of renovation, brick quality improved and the acceptance rate increases from 80% to 92%. Most of the products are sold on the local market in Xian.</p>	<p>Production process and equipments: Boxing feeder— Hi-speed fine rolls— Double shaft mixing extruder— Two-stage vacuum extruder— Column cutter— Green brick cutter— Adobe transporting machine— Natural drying— Firing in annular kiln</p> <p>The main energy consumption equipments 1)The rebuilt 38 chambers annular kiln 2)Boxing feeder 3)Cinder crusher 4)Hi-speed fine rolls 5)Double shaft mixing extruder 6)Two-stage vacuum extruder 7)Column cutter 8)Green brick cutter 9)Blower</p>	Internal combustive coal (t)	9240.00	0.29	2639.87	Coal: 1.20 tce/10,000 bce	2,200	10,000 bce/a.	2,783.11	2.493	6,938.29	51.27	12,000.00	Financial Assistance	The renovation project had been completed according to the technical plan.	2005.03.10 ~ 2005.08.31	Cost of energy saving	125.33	¥1/tce	2,600	10,000 common bricks/a.	604.76	1,507.67	<p>1)The baseline year is in 2004 2)The data in Business Profile column comes from field investigation. 3)Physical quantity of energy consumption comes from the Feasibility Report. 4)Conversion factor is derived from formula, that is Conversion factor = Factual calorific value of fuel/ Calorific value of coal equivalent. The plant uses the poor coal with low calorific value. 5)Total investment and GEF comes from the renovated actual data. 6)Payback period, IRR and NPV is calibrated on the basic data after renovation. 7)Energy consumption of unit product comes from actual determination.</p>
				External combustive coal (t)			0	Power: 0.065 tce/10,000 bce																		
				Power/MWh	374.00	0.383	143.24																			

13	Xiangyi New Building Materials Co., Ltd. Nian	This plant was established as a small privately owned plant in 1997. It occupies an area of over 115 mu (1mu=1/15 hectare). Prior to the project, the plant has fixed assets of 3.00 million RMB Yuan and produces an annual output of 23 million bricks (common brick equivalent). While it has fixed assets of 3.50 million RMB Yuan and produces an annual output of 26 million bricks (common brick equivalent) after renovation. At present, the plant employs 90 people including 11 technical people and the salary is 870 RMB Yuan/month on average. The main raw material is clay and coal. The two main products are fired perforated brick (module 240·115·90) and fired hollow brick (module 240·240·115). The price of the perforated is 0.36 RMB Yuan/piece and the perforation rate is over 26%. The price of the hollow is 0.98 RMB Yuan/piece and the perforation rate is over 45%. As a result of renovation, brick quality improved and the acceptance rate increases from 83% to 93%. Most of the products are sold on the local market in Nian.	Production process and equipments: Cinder crusher+ boxing feeder--- coarse rolls---hi-speed fine rolls---double shaft mixer---vacuum extruder---vertical column cutter---green brick cutter---natural drying---firing in annular kiln The main energy consumption equipments 1)New 28 chambers annular kiln 2)Cinder crusher 3)Hi-speed shaft mixer 5)Vacuum extruder 6)Vertical column cutter 7)Green brick cutter 8)Exhausted blower	Internal combustive coal (t)	6500.00	0.196	1,274.00	Coal: 1.20 tce/10,000 bce	2,300	10,000 bce/a	2,928.49	2.493	7,300.72	50.8911	12,000.00	The renovation project had been completed according to the technical plan.	2005.03.10 ~ 2005.08.31	Payback period 2.6 year	IRR 46.12 %	NPV 75.70 ¥10,000	Cost of energy saving 118.60 ¥1/tce	2,600	10,000 common bricks/a	Coal: 0.970 tce/10,000 bce	628.15	1,565.97	1)The baseline year is in 2004. 2)The data in Business Profile column comes from field investigation. 3)Physical quantity of energy consumption comes from the Feasibility Report. 4)Conversion factor is derived from formula, that is Conversion factor =Factual calorific value of fuel/Calorific value of coal equivalent. 5)Total investment and GEF comes from the Installation and Commissioning Report. 6)Payback period, IRR and NPV is calibrated on the basic data after renovation. 7)Energy consumption of unit product comes from actual determination.		
				External combustive coal (t)	2360.00	0.632	1,491.52	Power: 0.07 tce/10,000 bce																Energy consumption				1.27 tce/10,000 bce	Coal: 0.062 tce/10,000 bce
				Power/MWh	425.50	0.383	162.97	Sum total																2,928.49				1.27 tce/10,000 bce	Energy consumption

14	Hongyi St. Xiangyi New Building Materials Co., Ltd. Nian	This plant was established as a collectively owned plant in 1980s. It occupies an area of over 150 mu (1mu=1/15 hectare). Prior to the project, the plant has fixed assets of 1.07 million RMB Yuan and produces an annual output of 25 million bricks (common brick equivalent). While it has fixed assets of 1.80 million RMB Yuan and produces an annual output of 28 million bricks (common brick equivalent) after renovation. At present, the plant employs 110 people including 10 technical people and the salary is 870 RMB Yuan/month on average. The main raw material is clay and coal. The two main products are fired perforated brick (module 240·115·90) and fired hollow brick (module 240·240·115). The price of the perforated is 0.40 RMB Yuan/piece and the perforation rate is over 25%. The price of the hollow is 1.00 RMB Yuan/piece and the perforation rate is over 37%. As a result of renovation, brick quality improved and the acceptance rate increases from 80% to 92%. Most of the products are sold on the local market in Nian.	Production process and equipments: Boxing feeder---coarse rolls---roll crusher---hi-speed fine rolls---double shaft mixer---double shaft mixing extruder---two-stage vacuum extruder---column cutter---green brick cutter---adobe transporting machine---natural drying---firing in annular kiln The main energy consumption equipments 1)The repaired 40 chambers annular kiln 2)Boxing feeder 3)Cinder crusher 4)Rolls crusher 5)Hi-speed rolls 6)Double shaft mixer 7)Double shaft mixing extruder 8)Two-stage vacuum extruder 9)Column cutter 10)Green brick cutter 11)Blower	Internal combustive coal (t)	10062.50	0.29	2874.86	Coal: 1.15 tce/10,000 bce	2,500	10,000 bce/a	3,032.84	2.493	7,560.88	72.75	12,000.00	The renovation project had been completed according to the technical plan.	2005.03.10 ~ 2005.08.31	Payback period 3.70 year	IRR 66.23 %	NPV 62.95 ¥10,000	Cost of energy saving 187.18 ¥1/tce	2,800	10,000 common bricks/a	Coal: 0.94 tce/10,000 bce	609.29	1,518.95	1)The baseline year is in 2004. 2)The data in Business Profile column comes from field investigation. 3)Physical quantity of energy consumption comes from the Feasibility Report. 4)Conversion factor is derived from formula, that is Conversion factor =Factual calorific value of fuel/Calorific value of coal equivalent. The plant uses the poor coal with low calorific value. 5)Total investment and GEF comes from the renovated actual data. 6)Payback period, IRR and NPV is calibrated on the basic data after renovation. 7)Energy consumption of unit product comes from actual determination.		
				External combustive coal (t)			0	Power: 0.063 tce/10,000 bce																Energy consumption				1.21 tce/10,000 bce	Coal: 0.056 tce/10,000 bce
				Power/MWh	412.50	0.383	157.99	Sum total																3,032.84				1.21 tce/10,000 bce	Energy consumption

